

CTO

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OCTOBER 1990
VOLUME FOUR NUMBER ONE
SEVEN DOLLARS

COVER STORY:

MAPPING OUT GLOBAL NETWORKS

MAKING SENSE OF CIO TURNOVER





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CIO

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COVER STORY

World Beaters

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Global network builders must be conversant with a wide range of technologies and standards. They must also be able to sort through a bewildering array of foreign offerings and regulations with a true spirit of élan. *By Meghan O'Leary*

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M O R E ► ► ►

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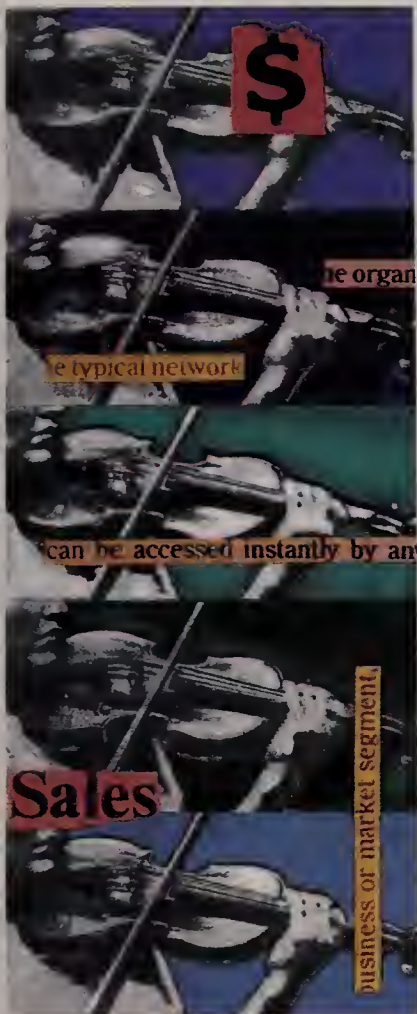
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SOMEBODY GOT
IT ALL WORKING
TOGETHER."**



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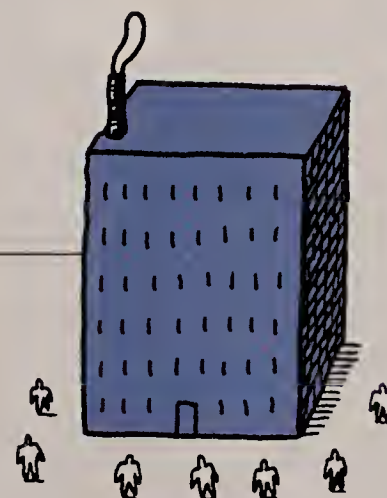
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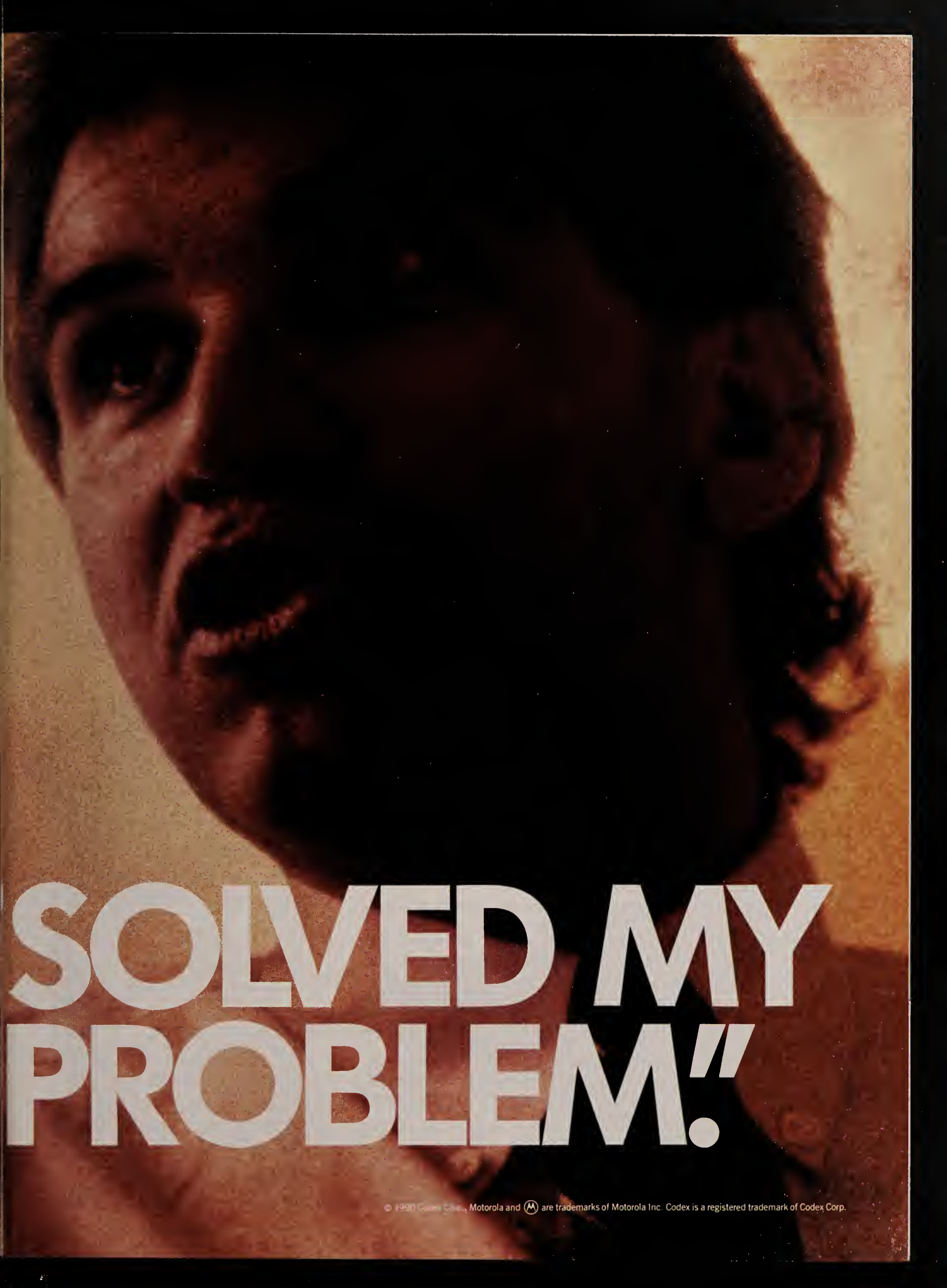
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LETTER FROM THE EDITOR

Two articles featured in this month's issue display the breadth of concerns that occupy CIOs. In our cover story, "Networking's World Beaters," beginning on Page 60, Senior Writer Meghan O'Leary illustrates that global networks allow an enterprise to present a worldwide competitive posture by tapping the expertise of employees regardless of where they are located. Closer to home, in our article "A New Twist on Turnover" (Page 48), Senior Editor Allan E. Alter presents a new perspective on the question of CIO turnover, an issue



that continues to haunt information executives. The CIO turnover rate, which is often reported at a sensational 33-percent level, actually varies widely and is attributable to reasons other than a CIO's poor performance.

Today's CIOs are challenged to adopt a transnational organizational perspective, which requires viewing enterprises not as a single, domestic hub to which and from which entities in the hinterlands transmit information, but as a portfolio of independent busi-

nesses. Global companies exhibit the flexibility to meet local needs and at the same time respond to global competitive challenges. Such enterprises do this by tapping into appropriate resources anywhere in the world.

A case in point is the Volvo-GM Heavy Truck Corp., where a global network permits computer-aided-design engineers to operate as a cohesive unit worldwide. Likewise, Coopers & Lybrand consultants can confer with peers worldwide to tap into expertise, wherever it resides, to solve client problems. These capabilities portend the arrival of the new organization that is unfettered by bureaucracy.

While a unified international electronic front can produce startling competitive results, building those networks requires CIOs to wade through a morass of standards and pricing options and understand local telecommunications infrastructures that are often less than state-of-the-art in order to assemble the network. Yet, faced with this confusion, CIOs who have bought into the global economy concept are juggling the options available to their firms to pull together an international communications network.

Creating the technological infrastructure that permits an enterprise to operate globally is risky business for CIOs. So when CIO turnover is discussed, it has largely been reported as a sign of CIO failure. It turns out that this may be a misleading stereotype. Our article reports that CIO turnover rates are not significantly higher than those for other types of executive positions. And, in many cases, CIO turnover is due to voluntary migration. So there appears to be considerably less substance behind the "CIO-stands-for-Career-Is-Over" controversy that has raged in recent months.

Today's CIOs have to shift gears quickly—one day acting as a global technological guru, the next day becoming an organizational change agent. Being on the firing line invites bullets, but bulletproof vests are becoming high fashion.

Marcia Blumenthal



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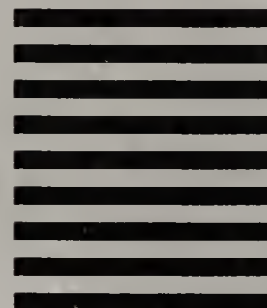
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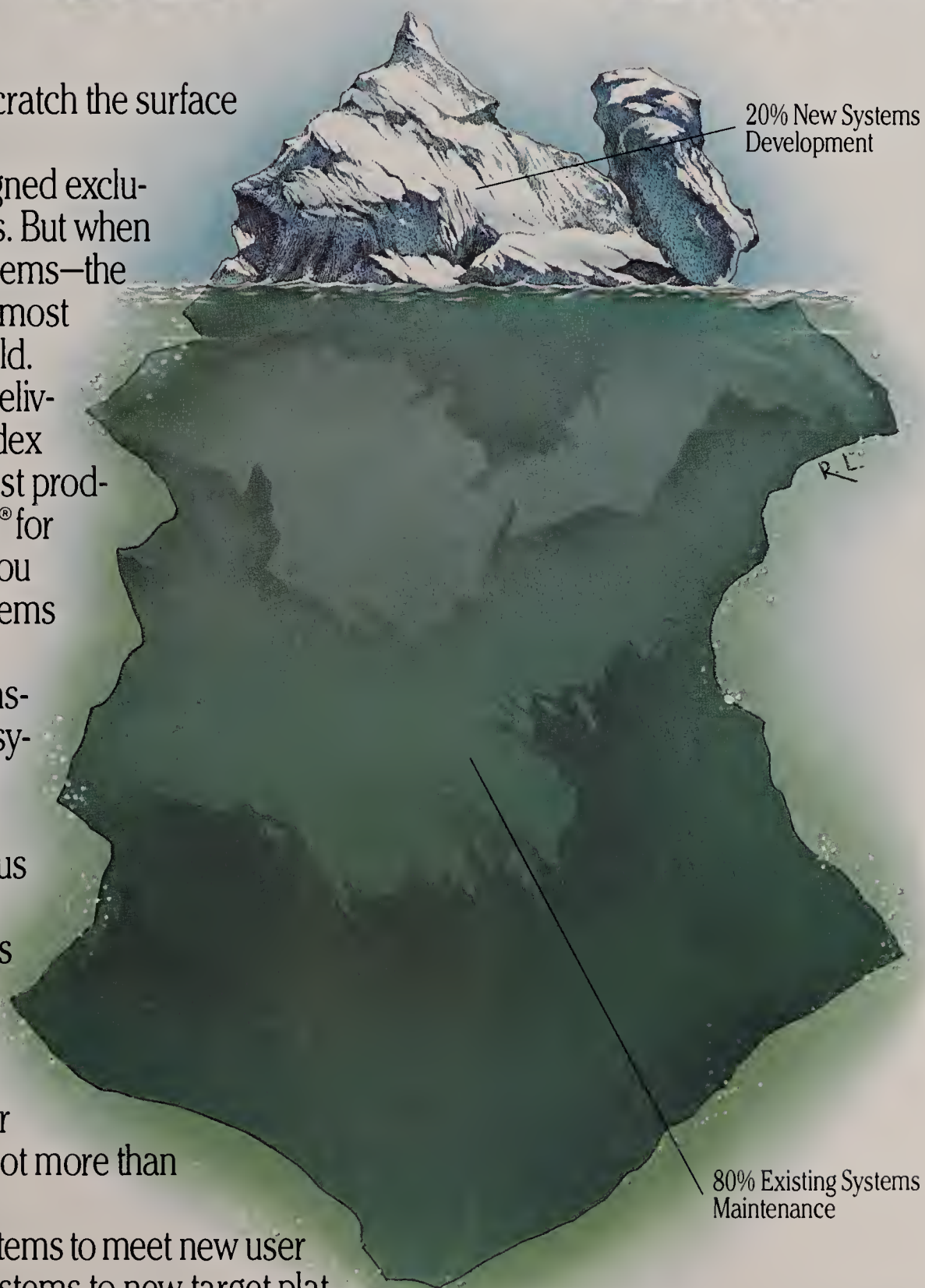
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*E.S. Woolard
Chairman and CEO
E.I. duPont de Nemours & Co.*

Dear Executive:

As you may know, October is National Quality Month. American industry must understand that quality improvement is a continuous process. As we get better, so does our competition. We are in a race in which there is no finish line. In my opinion, if quality is the goal, then information is the key ingredient needed to achieve it.

Recently, Motorola was awarded the Malcolm Baldrige National Quality Award. Motorola spends \$50 million a year on worker training, about 40 percent of which is devoted to quality. A good example of the marriage of information and quality is Motorola's pager plant in Florida. Two hours after an order is entered into computers in Illinois, a customized pager comes off the line in Boynton Beach. The entire procedure—deploying the robots gathering the supplies and assembling, inspecting, and packaging the final product—is managed by computers.

Yes, quality is important, but where would quality be without information? If October is Quality Month, how about a National Information Month? What are your thoughts?

Wynne L. Lutz

Coming In CIO

Scanners

Companies today are trying to make broader use of scanner data by moving it out of the marketing department and putting it to use throughout the company.

CIO Turnover, Part 2

As a follow-up to this month's article, *CIO* looks at how a frequent changing of the IS guard can affect the IS department itself.

In the Chips

CIO takes a look at the latest in semiconductor technology and the faster, more-powerful personal computing systems it makes possible.

Intelligence Gathering

Companies are increasingly using externally generated information in order to stay a jump ahead of the competition. But raw data alone isn't worth the disks it's written on; to be of value, the information must be effectively analyzed and distributed to the appropriate executives.

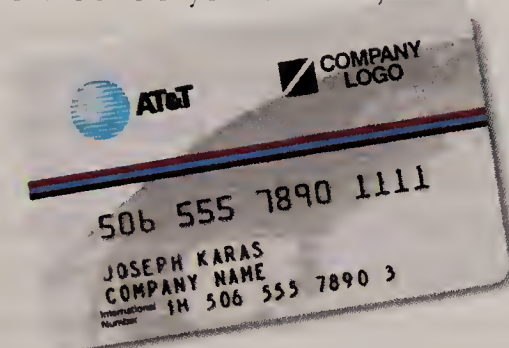
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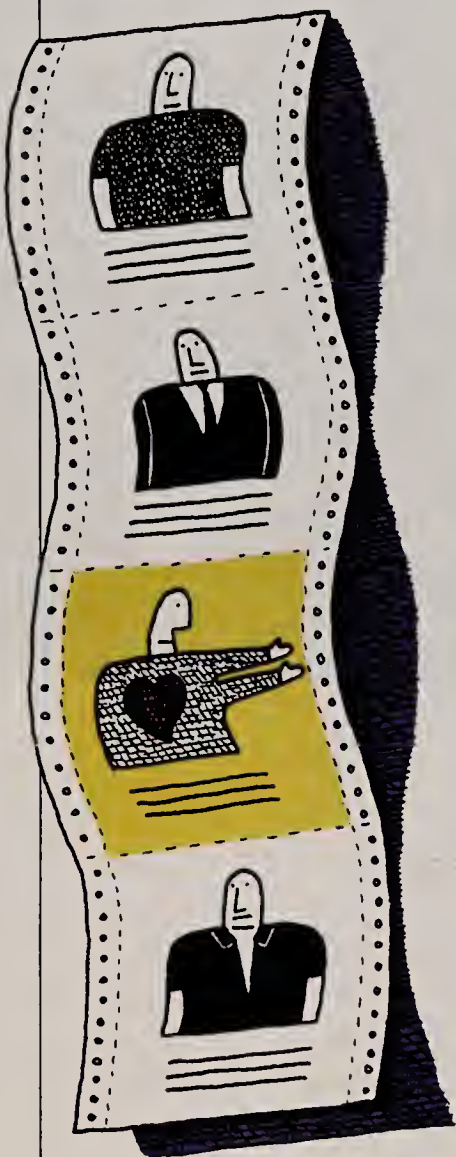
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TRENDLINES

SOCIAL SERVICES

THE AUTO-MATING GAME

Jean-Paul Sartre got it wrong. Hell isn't other people—hell is trying to meet other people. At least that's the philosophy expounded by David Hilger, who has invented a computerized



meeting service designed to put the fun back in the hunt for that special someone.

Dubbed IntroVision, the Entertainment Service, Hilger's "high-tech icebreaker" is a \$50,000 customized mobile computer that comes equipped with everything from sonogram hardware to proprietary database software to optical scanners. Based in Cambridge, Mass., Hilger and his partner, Sheldon Smith, have

thus far put IntroVision to the test at Venus de Milo, a Boston nightclub where patrons get to sample the system for the price of admission.

Upon entering the club, patrons fill out compatibility questionnaires, developed by psychologists, which concern such probing issues as designer clothes and fast cars. While the questionnaires are tallied by optical scanners, patrons pose before a video monitor and are photographed by a "frame-grabber," which freezes real-time video images into photos. The questionnaires and photos are stored in a database, and each patron is issued a personalized bar code. When the bar code is scanned, the computer rummages through the database and prints out a sheet of paper containing the photos and first names of seven people with the most similar test results. It is then up to each individual to search the club and locate the people on their sheets. Those who are unlucky with their initial pool of



candidates can have their bar codes rescanned and get updated sheets of prospective mates throughout the evening.

The impetus behind IntroVision is the nation's changing demographics—according to Hilger, the singles population has increased 75

percent over the past 20 years while traditional social networks have waned. "It's hard for busy single people to meet each other," Hilger said. He also views the service as an activity in itself. "IntroVision is designed to be entertainment as much as a venue for finding people. . . . It gives people something to do besides dance and drink."

Of course, Hilger and Smith have plans beyond being gratis Cupids. If people are smitten with the nightclub system, they can sign on (for a one-time fee of \$250 plus \$15 per month) for the IntroVision at-home service. Every month, clients will have their bar codes scanned and sheets mailed to them, and they can contact any people through a centralized voice-mail system.

With a little luck, love may be just a touch-tone phone away. ■

PERCEPTIONS

A SOBERING SERVICE SURVEY

Air travel isn't the only arena where service seems to have declined during the past decade. With the notable exception of information technology vendors, the quality of service is perceived to have declined in virtually all areas of the economy, according to corporate executives surveyed by the Ft. Worth, Texas, executive search firm of Paul R. Ray & Co.

Overall, some 52 percent of the executives surveyed reported that the quality of service in America seems to have fallen; 39 percent believed it has increased. Forty-five percent pluralities said service was sub-par in both the auto-

CHECK YOUR LOCAL LISTINGS

NOVA, the PBS science series, will take a look at technology-aided micromarketing strategies in a program entitled "We Know Where You Live," scheduled for broadcast on Tuesday, Oct. 9. The program, reported by San Francisco writer Erik Larson, explores the collision between individual privacy rights and the free exchange of information as embodied in direct-mail marketing campaigns. In their efforts to segment the market into likely sales prospects, direct marketers draw upon huge databases of personal information about individuals, including their purchase and credit histories.

The program looks at the legal and ethical considerations in compiling and using a resource that one civil-liberties attorney describes as "a de facto national database on citizens." It also looks at how, once a prospect is identified, a successful sales pitch can be crafted and delivered. ■

TRENDLINES

motive and defense-contracting sectors—by far the largest number of nay votes. Second place in the negative category was shared by airlines and retailers, with 33 percent poor ratings.

Now the good news. A 65 percent majority declared service to be better than average in the telecommunications sector; 59 percent said it was better than average in the technology hardware sector. When executives were asked to name a large company they believed set the standard for service quality in the United States, IBM Corp. was the clear winner—with just over 14 percent of the total vote. Big Blue was followed by Nordstrom Inc., the Seattle-based department-store chain, which garnered just under 9 percent (this despite the retailing industry's poor overall showing in the survey). Two individual airlines—American Airlines Inc. and Delta Air Lines Inc.—also received significant numbers of votes despite their industry's service difficulties.

Among smaller companies, the leader was L.L. Bean Inc. of Freeport, Maine, getting the endorsement of 3 percent of the executives in fragmented polling. Second place went

2ND ANNUAL HACKER SHUTOUT

LeeMah Datacom Security Corp. is probably feeling pretty smug about now. For the second year in a row, its invitation to hackers to try to beat its security system has produced no successful break-ins. Thus, the two-week vacation for two in either Tahiti or St. Moritz remains an unclaimed prize.

According to LeeMah officials, this year's two-week contest both attracted and repelled 2,009 hackers, compared with last year's 7,476. Apparently the word is spreading.

LeeMah President John Tuomy claims that his company's system, called TraqNet, combines several layers of protection to present hackers with the daunting odds of "one in 72 quadrillion" of a successful penetration. (The challenge to hackers both years has included giving away the password.)

After last year's contest, many hackers complained that one of the unpublicized security barriers was a shortage of phone lines to hack through, so this year LeeMah extended the

event from one week to two and added more lines.

Naturally, LeeMah is pleased as punch to have soundly thwarted hackerdom again. (One wonders whether the press release would have arrived with such cheery timeliness had someone captured Tahiti.) In any event, said Tuomy, "we did what we set out to do, which is to prove that hackers can be defeated."

Patiently, we await the hacker press release. . . .



to Land's End Inc., Bean's Dodgeville, Wis., mail-order competitor, which garnered just under 1 percent of the votes.

Ray & Co. mailed its survey to a random group of 6,900 executives drawn from the firm's 13,000-name mailing list. 534 people responded, 31 percent of whom were presidents, chairmen or CEOs; 54 percent were vice presidents or department heads.

MANAGING THE FUNCTION

IS LAGS IN QUALITY PURSUIT

The so-called total-quality movement has yet to light a fire under most IS groups, leaving them out of synch with the quality emphasis that now pervades many organizations.

According to Tobey Choate, a vice president in charge of the worldwide information-technology and telecom management practice at Arthur D. Little Inc., a Cambridge, Mass., consulting firm, the IS function has largely ignored the potential of what Choate calls "Total Quality Management." A major symptom of this neglect is that many IS groups continue to measure their performance by such internally driven benchmarks as computer up-time rather than by standards of customer satisfaction.

Choate proposes that IS groups adopt a pervasive customer focus and solicit the involvement of users in crafting

externally defined performance standards. In addition, ways of measuring performance against those standards need to be built into the delivery of services. Meeting or exceeding guidelines, said Choate, should be accompanied by an attitude of continuously searching for improvements.

Once the total-quality imperative has been articulated, the IS group needs to identify key customers and suppliers, establish customer requirements, reveal gaps between existing service levels and customer requirements, set priorities based on impact, and prescribe specific actions.

Choate also suggests that quality teams be formed to keep the process on track. Designed properly, he said, a quality program "is a living, dynamic tool that will enable an IS department to evolve along with its customers."

WRITE, DON'T CALL

Just suppose there's a company that uses handwriting analysis to create databases for direct-mail purposes. Sound interesting? We thought so, too. Unfortunately, the tantalizing, but mysterious, press release describing such an enterprise raised a few more questions than it answered. Such as, why doesn't anyone pick up the phone at the number provided?

Never mind. . . . What we are able to surmise is this: Certain revealing characteristics of personal motivation and interest are discernible in the way you cross your T's and dot your I's. Such characteristics can be extrapolated into possible buying motives, and individuals with similar sets of characteristics can be "segmented" accordingly in a database.

If your curiosity is pliqued, you can contact G-A-M Associates, 616 Larame, Wilmette, Ill., 60091. Or can you?

Write to them. We hope they'll be glad to hear from you.

ILLUSTRATION BY JULIA TALCOTT



"My ultimate PC system? It's got to be compatible with everything I've got already... so you can move data from one PC to another on a floppy."



"Networking PCs is a pain. I'd like them designed to do networking without lots of configuration work... in networks I've already installed."



"The perfect PC would be an ideal client to all my information systems... putting data in the hands of decision makers in a form they can use."



"I'm tired of vendors changing operating systems. I want to drop a new box on my executives' desks and know their software will run."

Hidden camera reveals the secret

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"Off-the-shelf software isn't enough. I need serious tools my existing programming staff can use to develop custom apps quickly."



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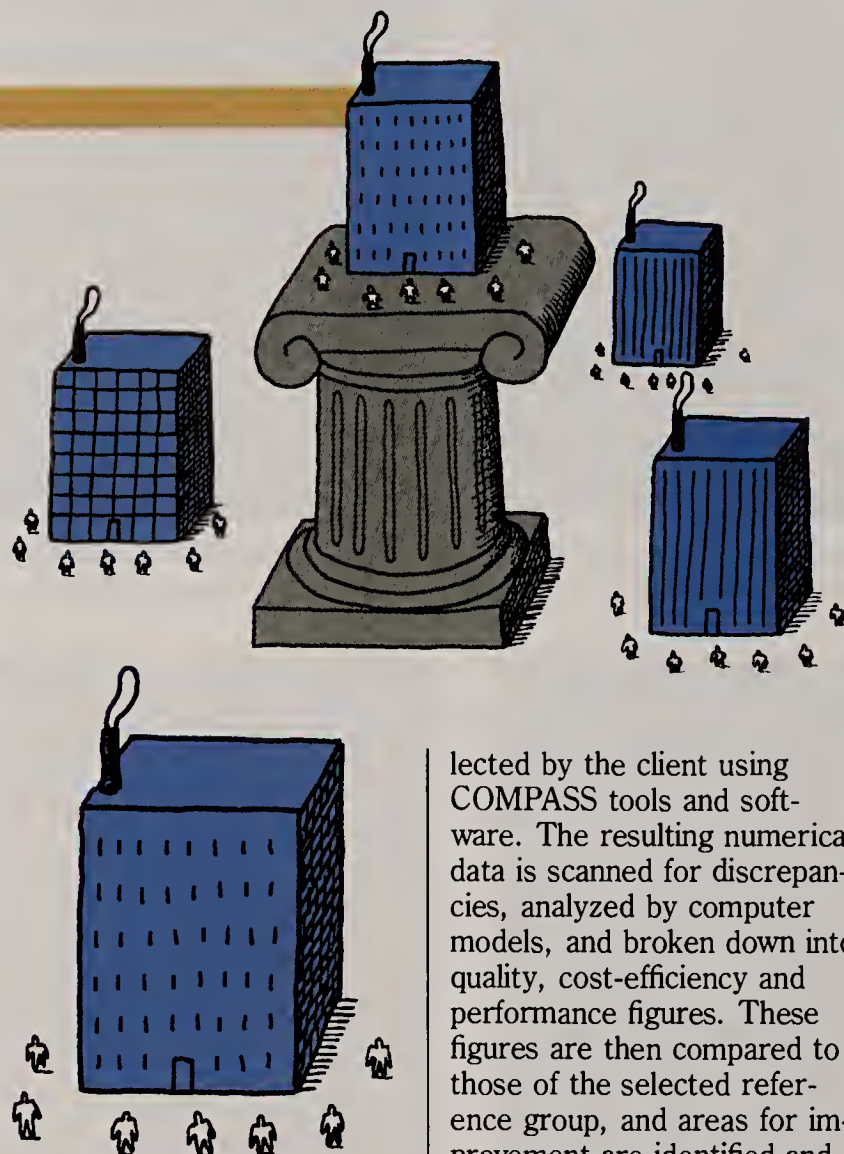
TRENDLINES

DATA CENTERS

OPERATIONAL ROLE MODELS

When it comes to streamlining DP operations, the best way to do it is by paying attention to details and learning by example. Or so say Olof Soderblom and Thomas Blitz, a pair of Swedish management consultants who hope their methodology for improving the quality and efficiency of large corporate data centers will take American companies by storm.

Soderblom and Blitz, who are co-chairmen of Compass Holding BV, first developed their statistical method of analysis in 1979. Since then, their company has sprouted several subsidiaries and has performed over 500 data center analyses for many of Europe's largest firms. Known as COMPASS (contortionistic shorthand for COMParative AnalySiS), their method is based on making detailed comparisons among their clients to determine the areas where companies can learn from each other. The clients that have the most efficient data centers, based on COMPASS price/performance measurements, are anonymously



combined in one of several "reference groups" and are the benchmarks for other clients to emulate.

"One of the many interesting [aspects] of combining clients in a reference group is that it has shown that there aren't many differences between data centers across industries," Soderblom said.

Each analysis takes approximately three months, with an average cost per site of \$50,000. Data measuring over 900 "reference points" is col-

lected by the client using COMPASS tools and software. The resulting numerical data is scanned for discrepancies, analyzed by computer models, and broken down into quality, cost-efficiency and performance figures. These figures are then compared to those of the selected reference group, and areas for improvement are identified and evaluated. Problem areas are prioritized and can be monitored by ongoing analysis.

According to Soderblom, most COMPASS analyses have resulted in cost savings of 20 to 25 percent for first-time customers, and the need for outsourcing has practically been eliminated. Compass America Inc., the latest addition to the subsidiary family, was opened last year in Herndon, Va., and Soderblom has little doubt that the decidedly communal COMPASS service will take hold among Fortune 500 companies in this country.

"This type of analysis has to be done on an extremely detailed level," he said. "The difference between us and [other consultants] is that we have an established methodology, computer models and a structured means of collecting and analyzing data."

If paying attention to detail is an indicator for success, COMPASS may become the most dominating Swedish export since grass-court tennis players.

TRIVIAL PURSUITS

Entrenched bureaucratic processes and the inability of executives to resist them combine to sap executive productivity at the impressive rate of 3½ months a year, according to a recent survey.

The survey of executives at 200 of the nation's largest companies, conducted for the temporary-personnel firm of Accountemps, turned up the view that 30 percent of executives' working hours are squandered on trivial tasks. Said Accountemps Chairman Max Messmer, "[T]his has vast implications for American productivity."

Survey respondents indicated they spend an hour and 12 minutes a day attending "unnecessary" meetings (two months a year); 32 minutes a day reading and writing unnecessary memos (one month a year); and 15 minutes a day holding on the phone



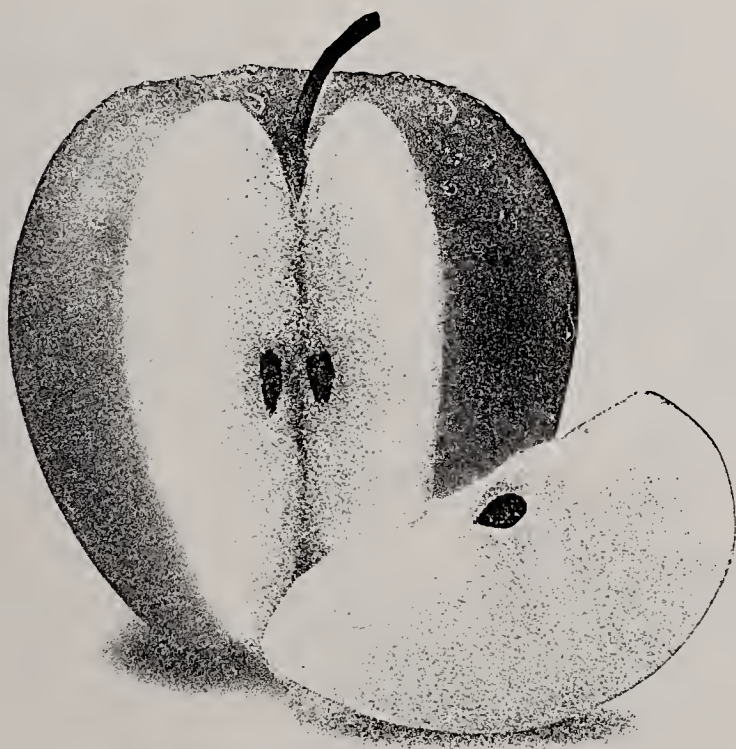
(two weeks a year). "Executives have the authority to remove bureaucratic systems," said Messmer, "yet they succumb to 3½ months worth of them each year. One can only wonder what's happening further down the ranks."

Messmer suggested that large companies mimic entrepreneurial firms that eschew pointless, time-consuming procedures.

CAREER MOVES

DAVID R. COX has been appointed vice president, information systems, and CIO of Northern Telecom Ltd., of Toronto, the Canadian branch of the global telecommunications company. In his new position, Cox is responsible for corporatewide IS planning, development, integration, operations and resources. He will report to Martin G. Mand, senior VP of finance and CFO.

Prior to joining Northern Telecom in 1987, Cox worked at Laurentien Group Corp., Crowntek Inc. and IBM Canada Ltd.



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TRENDLINES

BRITISH STERLING

ENGLAND'S IS STARS MOVE ON

A generation of British IT gurus is passing. According to Alan Cane, the reporter who follows the IS management beat for London's *Financial Times*, many of the U.K.'s most highly respected IS executives are becoming consultants or retiring.

The exiting CIOs, according to Cane, include Colin

Palmer, formerly of Thomson Holidays, now an independent consultant in Rickmansworth, Hertfordshire; Barclay Bank's Trevor Nicholas, the "doyen of British IT supremos," according to Cane, who took early retirement at age 54; Philip Collings of Whitbread,

directors are frustrated by that." And thus Palmer, Collings, et al., left after "having done all they can to do their job well and improve their reputation," in Cane's opinion.

A recent survey of more than 600 European companies by the Amdahl Executive Institute, reported in *Director*, a British business publication, lends support to Cane's opinion. The survey found that "IT does not yet sit comfortably in many British boardrooms." For example, only 59 percent of British IT managers surveyed—a smaller percentage

CORNING'S CIM KUDO

Corning Asahi Video Products Co., a producer of color television glass parts based in State College, Pa., has won the Society of Manufacturing Engineers' Industry Lead Award. The Lead Award is widely considered the most prestigious prize in the field of computer-integrated manufacturing (CIM).

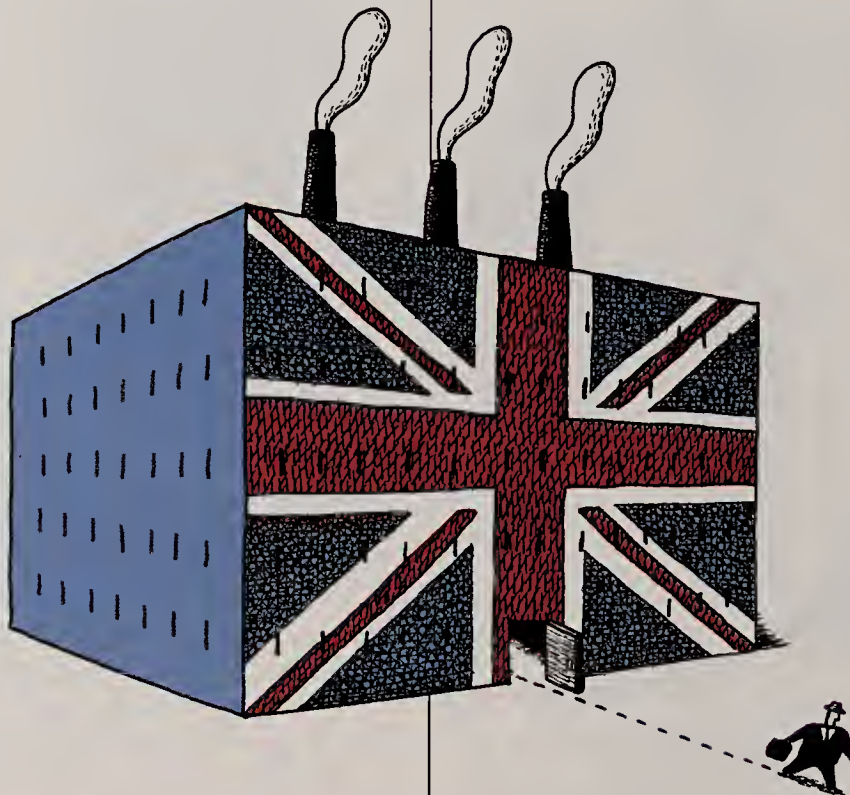
According to the SME announcement, Corning Asahi uses CIM to integrate all accounting, ordering and billing procedures as well as its engineering and design functions. Glass melting, forming and finishing process data is also integrated into the system, where it is used by plant floor operators for hour-to-hour process control. In the future, Corning Asahi plans to expand its CIM system to link up with its sales and marketing functions.

Previous Lead Award winners include Digital Equipment Corp., Allen-Bradley, Texas Instruments Inc., and Martin Marietta Corp.

who has also gone into consulting; and John Spackman, who headed British Telecom's information technology function. These are some of the British IS chieftains who made their reputations by deploying technology as a competitive weapon.

Cane theorizes that these exemplars left their jobs out of frustration. In Britain, he said, CIOs "are still not becoming part of the business function, even though they have reached the top [rank] of IT. I think there is no route from IT to the general business function, where they [can] help to make the decisions that guide the company. Many information technology

than their German, French and Italian counterparts—agreed with the statement that "top management understands how IT presently contributes to the business."



ATHENA BRANCHES OUT

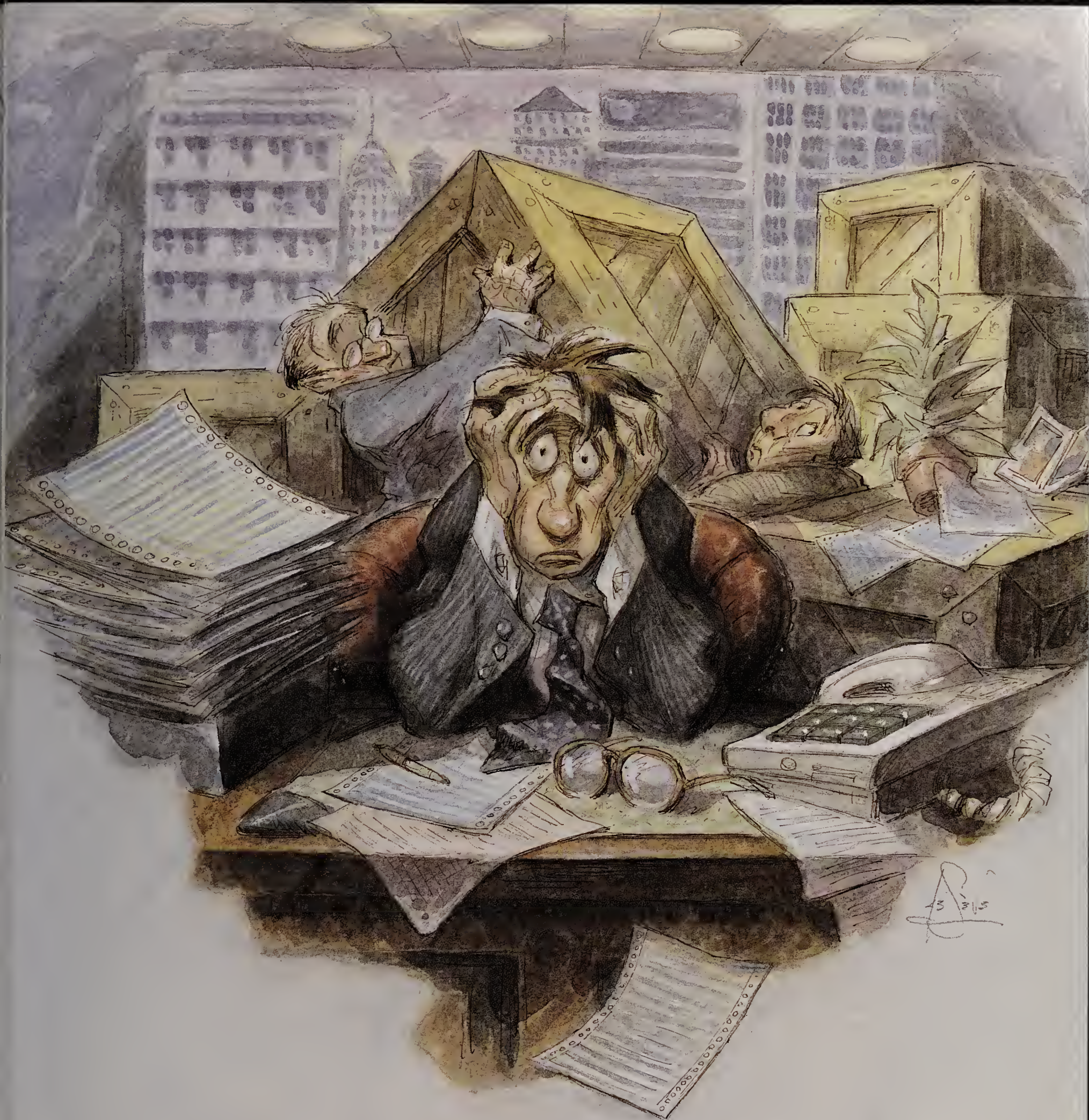
Athena, the campuswide network developed at the Massachusetts Institute of Technology jointly by IBM Corp., Digital Equipment Corp. and MIT, will soon be implemented at two other college campuses. North Carolina State and Iowa State universities have recently signed contracts with DEC to install the Athena systems software, linking together hundreds of workstations.

The Unix-based Athena network was designed to centrally manage computing resources for universities, in the hope of solving the traditional problems schools face in managing networked Unix workstations—mainly the prohibitive cost of network management and system security. MIT, for example, runs its 1,000-workstation link with a staff of six people. Athena also enables user access to such powerful and valuable off-campus resources as supercomputers.

DEC is currently offering planning, installation and staff training support to universities interested in adopting the Athena system.

CLARIFICATION

In a recent article on multivendor networking ("The Gathering of the LANs," *CIO*, July 1990), Herbert J. Martin, president of The Wollong Group, a producer of multivendor interconnectivity software based in Palo Alto, Calif., was quoted out of context with regard to interoperability. By way of clarification, Martin said that while basic interoperability between systems and applications is available today, "there's a tremendous amount of applications redevelopment that needs to be done" to achieve the client/server computing model.



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The Network Value-Mart

Alliances between value-added data and voice network providers have created one-stop shopping for network services

BY JOSE A. COLLAZO

Your communications vendor list is about to become shorter. The growing demand for universal voice and data services pushed four key value-added data networking companies to form alliances with major voice vendors in the past year. Within months, the international value-added network (IVAN) market was reborn. The payoff for CIOs is that they and their communications managers will soon achieve substantial economies of scale through having only one vendor accountable for all of their voice, data, messaging and EDI services. And users with global needs will no longer have to deal with separate vendors on a country-by-country basis.

Before looking at the implications of this rebirth of the IVAN business, here's a rundown of the new alliances:

- Infonet has joined forces with MCI, whose fiber network offers greater connectivity in the U.S. and bolsters Infonet's ability to deliver hybrid and private networks with integrated voice, fax, image and data capabilities.

- AT&T has formed an alliance with Istel, a British company, in order to strengthen its domestic data networking and give it an international VAN presence and access to Istel data technology.

- McDonnell Douglas Network Services and British Telecom have combined to form BT Tymnet, which will offer direct access between the American and British markets for VAN and voice services.

- Telenet and US Sprint have formed the Sprint Data Group. This consolidation involves a move to fourth-generation packet switching.

Initially there may be some confusion about what these vendors offer



and how they will operate. Before IVANs and voice vendors can make one-stop shopping a reality, they face the challenge of synchronizing their joint sales, marketing and customer-support functions. CIOs should find out what plans their vendors have for providing integrated voice, data, EDI and messaging.

In the short term, companies will receive more communications capabilities for roughly the same amount of money. Later on, when full economies of scale are attained, users can anticipate savings not only from more efficient operations but also from access to IVAN capabilities that reduce operating costs. Moreover, in response to user demands for integrated network solutions, IVANs and voice vendors are working toward providing not only all the basic telecommunication services available today, but also integrated voice/data networks, LAN/WAN links, vertical application solutions, and worldwide network management capabilities.

A common denominator in these services is X.400 connectivity. The growing acceptance of the CCITT X.400 electronic messaging standard

among IVANs is providing a universal "envelope" for users. Just as the post office will accept any size or shape of document provided it is placed inside a standard envelope with proper postage, so will X.400 enable the universal exchange of electronic information, regardless of its format. The expanded use of X.400 is making interconnectivity between public and private E-mail carriers simpler and expanding access to networks worldwide.

Low-cost, flexible EDI services go hand-in-hand with X.400 connectivity. With on-site training and support staffs in multiple overseas locations, IVANs can train new users and help to smooth the transition to EDI and electronic funds transfer. By implementing standard operating procedures and making protocol conversions on-site, IVANs can also resolve differences in how business partners handle international transactions on a country-by-country basis.

While the IVAN market has been irrevocably changed in 1990, value-added vendors cannot forget their origins. IVANs have thus far succeeded in highly competitive environments by adding value to their backbone networks through protocol conversion, error detection, electronic mail, time sharing and downloading of software. Although these new alliances with voice vendors have resulted in the rebirth of the IVAN business, their ultimate success depends on continuing to add value to services that are of importance to information executives and the users in their organizations. ☐

Jose A. Collazo is president and CEO of Infonet, an international value-added network services company based in El Segundo, Calif.

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Conducting Business

Management guru Tom Peters champions the end of hierarchies, but some endeavors cry out for a controlling hand . . .

BY CHARLES FELD

Power to the people" and "small is beautiful"—sentiments once more likely to have been heard in the counterculture than the corporate boardroom—seem to have become part of a new radical chic in business dogma. Popular critics like Tom Peters apparently believe that the wellspring of corporate wisdom almost always lies at the lowest levels of the organization, far from headquarters and the senior executive suites. Chief information officers, Peters said in the August 1989 issue of *CIO*, should "... empower other people to do things themselves. . . . God help the company where the CIO becomes the chief force for centralization."

With such thoughts gaining ever wider currency, it has become time,

I think, to defend the notion of central corporate control, especially over an enterprise's essential information resources. The practice has served Frito-Lay well, and it gives us, I would argue, a significant advantage in the nationwide battle for market share in the highly competitive snack food industry.

Frito-Lay is a national company with 40 plants stretched across the continent, each making products to centrally determined specifications. Our idea of using information technology to enable this structure is to be very, very centralized in some areas, while decentralizing in most others. We maintain a unified structure in systems that support accounts receivable, accounts payable, general ledger and customer applications. This structure, in turn, supports a single system of buying raw materials, providing the economies of scale needed to maximize profitability while delivering the right products to customers at the right time.

Regarding decentralization, we have divided the country into 32 sales and marketing units focused on regional differences. Without central direction, they might develop 32 different approaches to areas considered key to our success—purchasing, logistics, manufacturing, etc. In addition, at times we find it beneficial to shift managers to different locations. If they were to take their own systems and procedures with them and change the way each division operated, we would not be able to build the kind of leveraged infrastructure needed to conduct a national business.

Although central leverage is important, the divisions should have the freedom to act on the external marketplace forces for their area. We believe this blend of centralization/decentralization, or "directed decentralization," is the formula of the

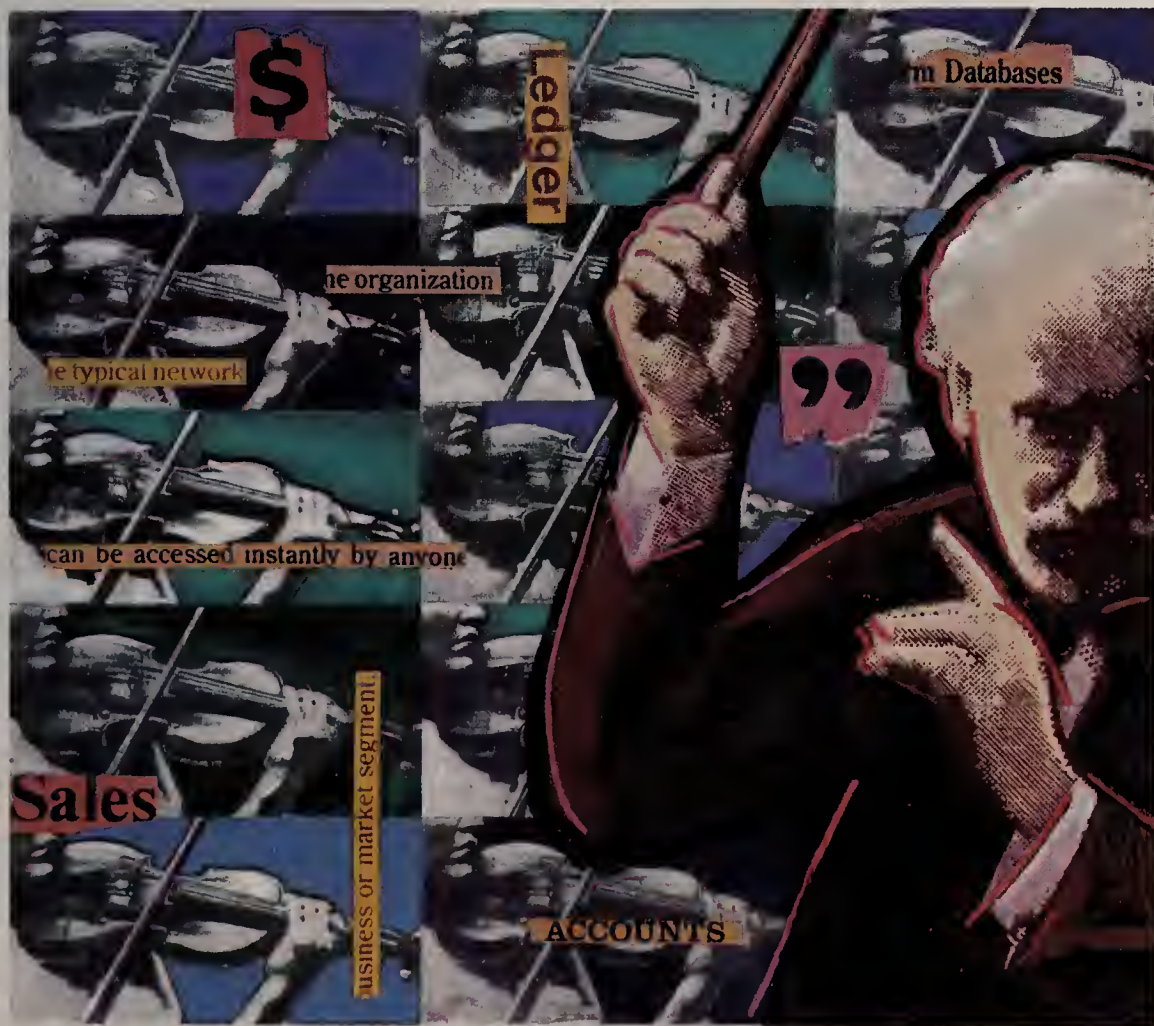


ILLUSTRATION BY ALAN MAZZETTI

future—and the technology infrastructure can help to enable that. It is very important to have a centralized database and network for commonality of some applications and to facilitate communications.

As raw data on sales, orders and production comes in, we transform it into management data and marketplace information tied to a specific marketing area. This data provides a means both for communication of common issues and sharing of ideas between different locations.

Our centralized manufacturing and accounting database also gives Frito-Lay unparalleled organization flexibility; any needed change in our structure merely requires a database reorganization. If senior management decided to "recut the deck," all they would have to do would be to give us the design of the new plan. We would be able to go in and reorganize the databases, and we'd quickly be on our way.

At companies with decentralized information systems, their architecture follows the current physical or-

ganization. Most any change in the organization would require consolidation of data centers, moving personnel and equipment, and perhaps even trying to meld incompatible hardware or software. Consequently, decentralization is a virtual prescription for later turmoil and dislocation since there is no such thing as an organizational pattern that will hold for 10 years in this rapidly changing business climate.

Consider, for example, AT&T. They have changed their form of organization: centralizing and decentralizing, and dividing along product lines, channels of distribution, software, vertical markets, etc. In the process, their data processing has ebbed and flowed. There is a core of AT&T's business that services customers, builds products, and pays suppliers which remained largely unchanged despite divestiture and deregulation. There were months when we couldn't get a proper bill from their system. But with centrally controlled and uniform information technology, they could have cut up the

database, simply changing the basic pattern of who needs access to certain information. Inevitably, one has got to disconnect the things that change from the things that don't.

The need to be centralized or decentralized is gray and very situational. Given a specific situation, it is fairly straightforward to determine which areas can give you leverage if they are centralized and which areas will give you speed and creativity in a decentralized atmosphere. Technology has made a new form of organization possible, and that's "big and mean." New possibilities are emerging. To the uninformed, Mr. Peters' viewpoints (uninterpreted) can have a devastating long-term effect. The ebb and flow of technological infrastructure is measured in years and millions of dollars in investments, and if a company selects a wrong course because of what is in vogue at the moment, they will pay a price that could cost them their very future. ☐

Charles Feld is the CIO for Frito-Lay Inc., based in Dallas.

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Logically Connected

Integration of the online enterprise has emerged as the new strategic weapon

BY KIRIT TALATI

Shrinking product cycles and instantaneous responsiveness to customer needs have revolutionized the role played by information processing. Corporations that are able to stay a step ahead in collecting, analyzing and acting upon information about their industry, clients, products and rivals also stay ahead of the competition.

For instance, by using information technology to identify detailed sales and inventory information from thousands of their salespeople, Frito-Lay Inc. can determine the market demand for a product within days and respond with appropriate marketing strategies immediately. Information technologies now integrate such disparate business functions as product engineering, operations, logistics, marketing and support in order to

speed up product development, delivery and support.

The time-based strategy driving major corporations in their quest for competitive advantage is critically dependent on integration of the online enterprise. Integration on a physical level is possible using emerging connectivity technologies. Physical connectivity alone, however, is not adequate because corporations have to divert their skills and time from application development to navigating networks and resources.

Effective integration of the online enterprise is possible only if corporate computing resources are logically interconnected. In a logically connected environment, applications can access resources and services without having physical access to them. The user sees multiple resources as a single integrated resource and as an extension to his or her computing environment. The user's ability to access any application and associated resources or data across the enterprise's information processing environment constitutes logical connectivity.

Integrating the online enterprise means integrating its four major environments: networks, data, user interface presentation facilities and applications.

Network connectivity alone will not provide access to information stored on corporate, departmental and desktop computing resources. Data connectivity technologies are required to allow applications to access data on such disparate resources. To meet this requirement, hardware and software vendors developed distributed database management systems such as IBM Corp.'s DB2 and relational databases based on structured-query language (SQL) standards such as Oracle and Ingres. These emerging



ILLUSTRATION BY DIANNE BENNETT

technologies have also created a need for remote data access standards that are being formulated using the client-server model.

Even with network and data connectivity technologies, applications are constrained by the need to map and manage different devices in order to present data to users. Presentation connectivity technologies (such as X-Windows facilities and the Basic Mapping Service offered in the IBM CICS environment) have been developed that move user-access interface functions outside of the application. These technologies eliminate the device dependency of applications and isolate them from user-access interfaces.

Despite the benefits offered by network, data and presentation connectivity technologies, applications were handicapped by the need to navigate amongst them. This obstacle was overcome with logical interfaces between applications and connectivity technologies that do the navigation for the applications. In application connectivity technologies such as the client-server computing model and cooperative processing, networking, data-access and presentation services are accessed by logical interfaces. The burden of navigating these services has been moved from the application itself to the logical interface servers. Consequently, changes in connectivity technologies can be implemented at the server level without affecting the application environment.

The technological achievement of logical connectivity has greatly facilitated integration of the online enterprise. The main integration solutions currently available are proprietary integration architectures, architectures based on open systems standards and distributed online transaction processing systems.

IBM's Systems Application Architecture (SAA) is an attempt to interconnect its incompatible computer systems by means of the backward integration of hardware and software technologies. SAA is a collection of standards and protocols implemented as logical interfaces in the development of cross-system applications. These interfaces allow users to de-

velop applications by accessing resources logically, thus providing logical connectivity across the major IBM platforms. Under SAA, applications can be processed in a distributed environment, sharing data and services even when they are executing on different IBM platforms.

In contrast to IBM, Digital Equipment Corp. has adopted a forward integration strategy based on a single proprietary operating system (VMS) that allows scalability of its applicator

*The time-based
strategy driving major
corporations in their
quest for competitive
advantage is critically
dependent on
integration of the
online enterprise.*

environment and distribution of data from workstations to mainframes.

Other major vendors have also presented blueprints for an integrated computing environment: Unisys Corp.'s Open Application Architecture, based on the X/Open Common Application Environment and the client-server model; Hewlett-Packard Co.'s Distributed Application Architecture; and NCR Corp.'s Open Cooperative Computing Architecture. These three software architecture strategies are also designed to provide enterprisewide distributed computing using logical connectivity technologies.

Open systems standards are emerging in response to the need for enterprisewide integration in multi-vendor environments. The establishment of open systems consortia made up of hardware and software vendors and users has provided impetus to the quest for industry standards acceptable to multiple vendors. Currently, standards developed by these bodies are moving toward full

logical interconnection of multivendor corporate computing resources.

Distributed online transaction processing (OLTP) systems such as IBM's CICS and Tandem Computers Inc.'s Pathway provide another solution to the problem of integrating the online enterprise. Here, distributed online transaction processing is understood as a mode of application processing in real time. Messages from user devices are processed for functions such as data manipulation while simultaneously distributing the processing of the application across multiple CPUs, whether the functions are on the same or on different computing systems.

The logical connectivity solutions offered by proprietary blueprints such as SAA, by open systems consortia like X/OPEN, and by distributed online transaction processing systems are all evolving toward SQL as a logical data-access interface, toward LU6.2 as a common communications interface, toward a common user interface and toward cooperative processing and client-server computing as a common interoperability interface. A distributed OLTP system extended to an open systems environment could be advantageous in integrating the online enterprise because large sets of applications already exist in the OLTP environment.

As logical connectivity technologies mature, a new kind of information processing system is emerging: a cross-functional system that ties together the various business units of a corporation to form a unified whole working together. The online enterprise, and with it the entire corporation, is being integrated with logical connectivity technologies that provide IS with the positive momentum and tools required to increase the speed of service delivery and enhance decision-making and productivity. The innovative integration of information processing "entrepreneur" by these technologies is a strategic weapon for the Information Age. ☐

Kirit Talati is chairman, founder and chief technical officer of VISystems Inc., a provider of enterprisewide distributed online processing in Dallas.

100

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CIO MAGAZINE

GOING UP...

After years of IS neglect, Hyatt Hotels Corp. is riding its revamped and expanded systems to the customer-service penthouse

BY MEGHAN O'LEARY

At one time Hyatt hotels, with their trademark glassed-in atriums, relied on creating a particular ambience to attract guests. Today the Hyatt Hotels Corp. of Chicago, which manages 106 hotels and resorts throughout the country, has made a technology commitment that allows it to rely less on aesthetics and more on service to keep its customers coming back.

In the last three years, the company has replaced and expanded 100 percent of its information systems with a distributed data network, a company-wide property-management system (PMS), and an advanced central reservation system (CRS). It is now working to develop

and enhance marketing and customer-service applications with the information gleaned from these two systems.

Hyatt wasn't always at the forefront of technology. In 1987, "we realized we were dramatically behind [others in] the hotel industry," said John Biggs, senior vice president of hotel accounting and administration.

At that time, the company's MIS group was building a PMS for all of the hotels. A PMS keeps track of room inventories, rates, guest records, hotel charges, staffing and other aspects of hotel administration.

Hyatt had already sunk some \$2 million into the project when the company's president, Darryl Hartley-Leonard, asked a question that often doesn't get asked in the sys-



JOHN BIGGS began reorganizing Hyatt's technology function in 1987.



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tems world, according to Gordon Kerr, who was later hired as vice president of MIS: What would Hyatt get out of the project? While the MIS department did have an answer—a PMS that would do 12 transactions per second—it wasn't exactly the answer Hartley-Leonard was looking for. He needed to know what the project would do for Hyatt in a larger business context.

"It's a trick question," explained Kerr, "because projects take on a life

said. "No matter how bright the MIS person is, if the head of the company doesn't really understand what you're doing, you may not be going in the direction [in which he or she] wants you to go. You may not be meeting [the company's] single biggest business objective."

Hyatt hired Touche Ross & Co. (now Deloitte & Touche) to assess the technology direction the company was taking and to make recommendations. "The key conclusion of that

study was, 'Don't continue to write the system for yourself; buy it off the shelf,'" said Kerr. Touche Ross determined that Hyatt's time would be better spent managing its properties than writing software. It suggested the company implement a PMS quickly, "because whatever benefits are there now [from an in-house system] will have evaporated three years from now when you finally get the system up and running."

According to Kerr, Hyatt realized

Faced with the choice of losing an investment or continuing development without a clear goal, Hartley-Leonard consulted with Biggs and they called a halt to the PMS project.

of their own, and all of a sudden you've spent a million dollars or \$10 million and you're afraid to ask . . . what you're going to get out of this." Kerr acknowledged that Hartley-Leonard was perhaps the only person in the organization who dared to ask such a question. Faced with the choice of losing an investment or continuing development without a clear goal, Hartley-Leonard consulted with Biggs and they called a halt to the project.

Still in need of a PMS and a technology strategy, Hartley-Leonard began educating himself to make long-term decisions about technology. He took classes offered by IBM; he talked to consultants. "He talked to everybody he could find, and what he was struck with was that our approach, right or wrong, had never had the high-level attention it should have had within the company," Kerr

The Spirit of Cooperation

By working together, a consortium of hotel chains has created the capability to exchange real-time reservation information with travel agents

The travel industry has come a long way from the days when American Airlines pioneered the central reservation system. In those days, an interface to somebody's—anybody's—CRS was considered a competitive advantage, and hotels were more interested in beating out their competition than in getting the best representation of their products. But today hotels are chafing under the limitations of the airline CRSs, which rely on periodic updates of room rates and availability data and require travel agents to make reservations by phone.

In order to expand the range of room information available to travel agents, a group of 17 national hotel chains has formed a consortium called The Hotel Industry Switch Company, or THISCO, which is headquartered in Dallas. THISCO's charter is to develop switches that will allow its members to exchange real-time room and reservation information with travel agents via existing airline reservation systems. Collectively, the company's switching capabilities are known as UltraSwitch. Each hotel company has developed its own interface to THISCO, which is working with AT&T and Anasazi Inc., a systems software developer in Phoenix, Ariz., to develop its products.

"Each industry has to come of age to the point where [its members] can cooperate among themselves to do something that helps everybody," said Gordon Kerr, vice president of MIS for Hyatt Hotels Corp. "To us, this represents a way for the hotel industry to be rapidly and uniformly represented to any outside agency."

According to Kerr, since UltraSwitch went live in May 1990, hotels have been able to send messages regarding current room availability to the airlines, who in turn send the information to the travel agents who sell the rooms. When a room is sold, the travel agent sends back notification. By the first quarter of 1991, the consortium hopes to have implemented the real-time interface with travel agents.

Historically, said Kerr, "[it] was always viewed as not competitive to cooperate with other hotels. What we all realize [now is] that we were fighting the wrong battle."

—M. O'Leary



it had to do four key things in order to lay the groundwork for growth: It had to select and implement a PMS in every property, revitalize its reservation system, leverage PMS and CRS information for marketing purposes, and put financial-reporting processes in place.

Since scrapping Hyatt's initial PMS project, Biggs had been busy cleaning out and reorganizing the Hyatt Technical Center (Hyattech), Hyatt's MIS department in Oak Brook, Ill. "They were not easy times," said Biggs. "We dismantled the whole organization, and then we had to go

back and start building credibility within the organization." To that end, Biggs hired Kerr.

When Kerr joined Hyatt in 1987, the company had six different PMSs in place—some with hardware and software dating back to 1975—and very few programmers who knew the code in which they were written. In addition to being old, the systems were ineffective and required a lot of maintenance. "[The PMSs] were barely keeping our heads above water in the large hotels . . .," Kerr said, "and we were

GORDON KERR:
laying the groundwork for future growth



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DARRYL HARTLEY-LEONARD: *It was better to lose a \$2 million investment than to continue the project without a clear goal.*

spending [most] our time . . . keeping [them] running. Nothing new for leverage or advantage was being done, and the rest of our time was spent worrying about opening new hotels. We were going backward, if anything."

Kerr decided that the only way the company could effectively maintain and enhance a PMS was to implement the same one in every Hyatt property. Since much of Hyatt's \$2 million investment in the first PMS had been spent on determining user requirements, Kerr had a jump on his task.

Hyatt brought its specs to PMS

vendors whose products it had evaluated, received bids, and chose a system from Encore Systems Inc. in Atlanta.

"The whole goal [of the PMS] was to take our great disadvantage and make it our advantage," explained Dan Amedro, assistant vice president of MIS, who oversaw the system's installation and staff training. That meant Hyatt had the rare opportunity to build its systems from scratch.

Until 1987, the MIS department had bought only IBM equipment, according to Biggs. In choosing Encore, which runs on a UNIX platform, it opened the door for a

distributed computing environment and hardware independence.

While installing the PMS, Kerr and Amedro learned the importance of establishing standard procedures for using the system across the whole base of hotels. After a problematic first installation in a Dallas hotel, the company developed an official policy and procedures manual. "We tried to focus the functionality of the system on things we wanted to be the same" from property to property, Kerr said. "I don't want them to check people in with a credit card in a different way in every single hotel," he said, "but they can greet them in any way they want."

At the time Marriott Corp. was also going online with a PMS, installing it at an aggressive pace of 12 to 15 hotels a year. Kerr decided that one way to get a jump on the competition was to challenge Amedro's group to install 100 systems in a year. From June 1987 to March 1989, Hyatttech did PMS installation and training at up to 12 installations a month.

After the PMS project was largely complete, Hyatt turned its attention to the second part of its four-part plan: revitalizing its central reservation system.

In 1987, the company had a four-year-old CRS that was limited and required a lot of maintenance. Its reservation center in Omaha, Neb., took reservations from callers to Hyatt's 800- number, but hotels who were afraid that Omaha would oversell them tended to greatly restrict the number of rooms it made available to the center, according to Joan Lowell, assistant vice president of reservations and telemarketing information services. Omaha had no real-time link to the hotels and relied on manual updates from each property on room availability. The center also had no information on special room rates, corporate accounts or group rates, which limited its usefulness to the individual hotels. In addition, a prospective guest was likely to get one room rate from a travel agent, another rate from Omaha, and yet

another rate from the hotel itself.

Hyatt wanted to connect the reservation functions of Omaha and the individual hotels while providing more timely, complete information on all the hotels to both Omaha and travel agents.

On August 18 this year, Hyatt implemented a central reservation system that allows hotels to send updates on the availability of rooms to Omaha electronically. Over the next six months, Kerr said, Hyatttech will add five key features to the system that will make it a cohesive, companywide CRS. These will include a direct interface to hotel PMSs that will give Omaha access to rate, availability and frequent guest program information; a direct interface to airline reservation systems (see related story) that will give travel agents up-to-date rate and availability information; functionality for group bookings (today, group rate plans must be constructed at the individual hotel); an interface for the handful of hotels that are not yet up on Hyatt's new PMS; and a separate CRS module that will run with the PMSs of the so-called "manual" hotels.

Hyatt had to do four key things: Select and implement a PMS in every property, revitalize its reservation system, leverage PMS and CRS information for marketing purposes, and put financial reporting processes in place.

Ultimately, the reservation system will let individual Hyatt hotels that are full book guests into other Hyatts. In addition to giving Omaha and travel agents access to current hotel rates, the CRS will enable the reservation center to answer and

TECHNICAL PROFILE

Hyatt Hotels Corp., based in Chicago, is a \$2.2B hotel management company operating 106 hotels and resorts in the United States. Hyatt owns about 40 percent of the properties it manages. The company's MIS operations are located in Oak Brook, Ill., at the Hyatt Technical Center (Hyatttech). Hyatt owns and operates a reservation center in Omaha, Neb.

Mid-Range Systems: AT&T 7080s and 3B2s, and a Hewlett-Packard 835 minicomputer reside at Hyatttech, handling centralized hotel functions and Omaha reservations. The hotels use AT&T 3B2s and Hewlett-Packard 835s and 850s to run their local PMSs.

End-User Computing: Hyatt has about 400 IBM PCs at Hyatttech, 150 in its corporate offices in Chicago, and about 1,000 in the field. The PCs at Omaha

emulate AT&T and Hewlett-Packard terminals and are linked to the minicomputers at Hyatttech.

Software: All systems except PCs are running UNIX and Informix from Informix Software Inc. of Menlo Park, Calif. The AT&T systems are running the Informix On-Line database engine. Hyatt's PMS software is from Encore Systems Inc., of Atlanta.

Networking: Hyatt operates a nationwide data network using TCP/IP over fractional T-1 lines. ACC routers connect Ethernet LANs at each property to the wide-area network. ODS Ethernet hubs at each property connect PCs and minicomputers to each other and to the network. Any terminal or PC at a property can access local applications such as the PMS or centralized reservation or marketing applications.

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DAN AMEDRO met Kerr's challenge.

book calls made directly to the hotels—an ability that could be especially helpful when hotel staff are busy checking in customers and don't have time to take reservations. The system will tell Omaha which Hyatt the guest is calling, and the caller won't know the difference.

With the PMS and the CRS in place, Hyatt is now beginning to concentrate on leveraging the information gathered from those systems in marketing efforts. Kerr looks at the marketing applications—which were “nonexistent” when he came on

board—as a five- to 10-year process that will evolve as the company learns to use its existing systems more effectively. Hyatt hotels currently use a system called Hymark that tracks information on group bookings and Gold Passport guests (Hyatt's frequent travelers). Hyatt will eventually allow Omaha and the individual hotels to share customer information for marketing purposes, in the same way that they'll share reservation information.

Financial and operations reporting—the fourth piece to the puzzle—

“We tried to focus the functionality of the system on things we wanted to be the same [from property to property]. I don't want them to check people in with a credit card in a different way in every single hotel.”

—Gordon Kerr

have not been developed as aggressively as the customer-oriented applications, Kerr admits. “We've done a number of things, but I'd hesitate to call it a system,” he said. “It's really an area of concentration over the next five years.”

In the meantime, Hyatt continues to investigate technologies that serve the customer, such as remote or electronic check-in; door locks that use the guest's credit card as a key; and voice mail for guests. Hyatt's distributed network infrastructure has been designed so that in the next five to 10 years, these and other incremental improvements will help the company leapfrog over the competition in its ability to use technology effectively in serving its customers.

“I suspect that now we're slightly ahead” of other hotels in that respect, Amedro said. “But we have the infrastructure, and in the next five years we're going to be significantly ahead.”

In designing its network for the future, Hyatt is insuring its success, said Kerr. “The biggest mistake people make is underestimating the pace of change in this business.” ☐

A black and white photograph of a rolled-up scroll. The scroll is unrolled in the middle, revealing the text "Don't seek and you shall find." written in a stylized, gothic font. The letter "D" is particularly large and ornate, with decorative flourishes. The scroll itself has a textured, aged appearance with some staining and frayed edges.

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A NEW **TWIST** ON TURNOVER

Once all the shouting dies down, there's no convincing evidence that CIOs are in any greater job-security peril than their executive peers in other functions. They may, however, be developing a taste for hitting the road . . . BY ALLAN E. ALTER

Is the CIO position a fast trip to nowhere? Much of the conventional wisdom says it is, and uses the oft-cited problem of high CIO turnover as supporting evidence. But the evidence for this view is inconclusive, at best.

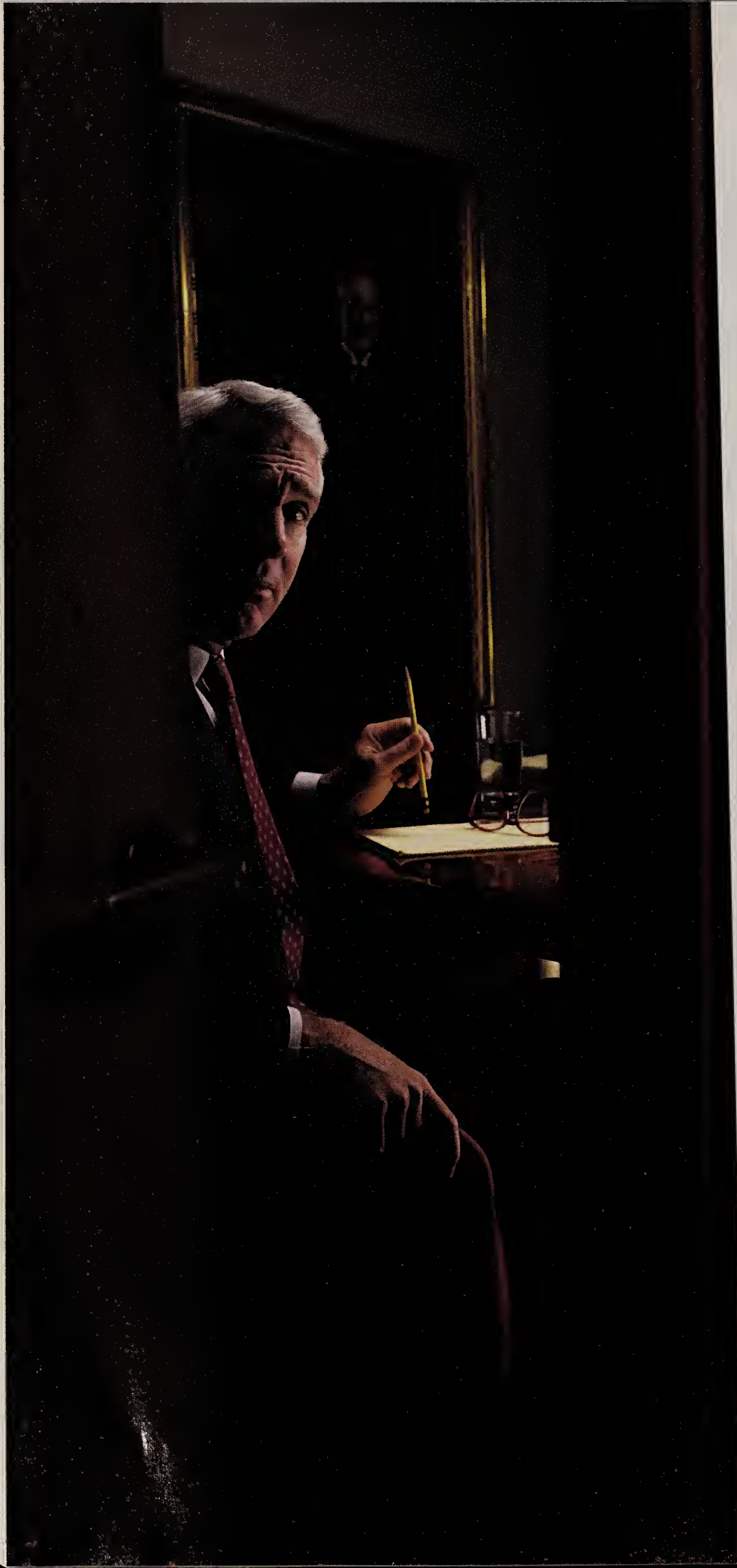
The lesson to be drawn from CIO turnover is not that the CIO is becoming an endangered species, but a migratory one. There are many reasons why this is so, and they have to do with broad business trends and larger questions of managing technological and organizational change. To blame CIO turnover on CIO failure is to hear just one side of the story—the side of the person who hires or fires the CIO. Worse, it deflects the question of CIO turnover from a more important issue—the consequences of turning CIOs into gypsies.

Few people who believe that CIO turnover is especially high have a factual basis for their beliefs. Consul-

itants and recruiters peg CIO turnover rates somewhere between 12 and 33 percent a year. Most base their figures on impressions rather than statistical evidence; at best, they have only hunches about turnover for other executives.

The fact is that the statistical evidence available is too scanty to support the conclusion that CIO turnover is worse than that for other executive positions. An exhaustive search has turned up no study that directly compares annual turnover rates for CIOs with other positions. And existing evidence suggests that CIOs are not significantly more prone to turnover than other executives.

We know how long CIOs have been on the job. Three independent surveys of CIO length of tenure conducted in the past two years—by Heidrick and Struggles Inc., Touche Ross (now Deloitte & Touche), and Coopers &



Networks Service level The CEO

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are bottlenecked.
levels are down.
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TURNOVER TAKES

Executive Longevity in Current Position



Source: Heidrick and Struggles Inc. surveys of Fortune 1000 executives, or Fortune 500 and Fortune Service 500 executives.

Note: Surveys were conducted in different years—1990 (chief human resources executives), 1989 (CIOs), 1988 (CFOs and chief marketing executives), and 1987 (CEOs).

Lybrand—each put the figure at 4.6 years. The Touche Ross study also set an annual CIO turnover rate of 15.6 percent in 1989. But only Heidrick and Struggles has also surveyed other senior executives (although in the year before and after its study on CIOs). They indicate that CIOs had been on the job for about half a year less than CFOs and human resource executives, and seven months longer than senior marketing executives (see chart). That undercuts claims that CIOs are significantly more prone to turnover than other executives.

Similarly, there is no data comparing CIO failure rates to failure rates for other positions. Only Touche Ross conducted a study of the reasons for CIO turnover; in 1989 and 1988 Touche Ross researchers asked current CIOs for the reasons their predecessors left their post. But Touche Ross did not survey other ex-

ecutive positions, making comparisons impossible.

Nor did the Touche Ross study inquire how many dismissals and voluntary resignations were due to mergers, acquisitions and other forces beyond the control of CIOs. That's an important omission. The late 1980s was an unprecedented era of mergers and acquisitions, leveraged buyouts, consolidations and restructurings. This has affected not just CIOs, but all senior executives. For example, 5 percent of the 13,500 members of the Financial Executives Institute (FEI), the trade association for CFOs, have turned to the FEI's new career counseling office during its first year of existence. According to Loretta D. Geis, who runs the service, most of these people lost jobs because of mergers, acquisitions, downsizing and business failures.

Unless a study can separate cases where CIO turnover was caused by managerial upheaval from those where it was not, and do the same for other executives, there's no justification for citing these statistics to make special claims about the "en-

dangered" status of CIOs.

Once the "CIO Stands for 'Career is Over'" rhetoric is stripped away, what remains of the brouhaha over CIO turnover? To begin with, there are a few facts.

First, CIOs move around for the same reasons that executives have always chosen to leave their old jobs: opportunity, promotion and disgruntlement. Recently, for example, Michael S. Heschel left Baxter International Inc., of Deerfield, Ill., and went to Security Pacific Corp. in Los Angeles because he wanted a new challenge and wanted to return to California, where he and his wife grew up. John P. Singleton, Heschel's predecessor at Security Pacific Auction Co., was promoted out of IS to general management. And James M. Newkirk and Trans World Airlines Inc. came to a parting of the ways because he became fed up with the struggling carrier's cost-cutting.

There's another reason CIOs and other executives have left their jobs: dislocation. The managerial upheaval of the late 1980s has taken its toll of many CIOs. Thomas Gaughan, along

Ports in the Storm

When the time comes for CIOs to set sail, where do they wind up?



According to observers of the IS management scene, ex-CIOs are most likely to take an IS management spot with another company. But CIOs who want out of IS have a tougher time. Finding work as a line manager is difficult, though becoming easier; and becoming a consultant is not as simple as many CIOs might think.

CIOs have made it to the upper echelon of the general management ranks (see "Migration Path," *CIO*, September 1989). But as Ron Brzezinski, the ex-Quaker Oats CIO who is now a consulting partner at Coopers & Lybrand, pointed out, most do so at their own companies. "The majority of IS executives will stay in the IS industry. A lot will go to another CIO job. Some go to smaller companies. Others go into

with many other executives, lost his job at Primerica when it merged with Commercial Credit. Gaughan is now the CIO at Home Insurance Co. in New York. Thomas Burger had been the vice president of information services at Dunkin' Donuts Inc. of Ran-

One CIO recalled that out of the 33 corporate officers at his former employer in 1985, only two remain.

dolph, Mass., until it was acquired by Allied-Lyons PLC of London. Newkirk can also be seen as a victim of the Roaring '80s—TWA's cost-cutting strategy was a direct consequence of its takeover by corporate raider Carl Icahn.

These CIOs were not alone when the axe fell. Within six weeks of the

Dunkin' Donuts acquisition, said Burger, "six vice presidents were asked to leave as a cost-cutting measure. The director of accounting survived, and accounting, treasury, human resources and information services wound up reporting to him. It was clearly a case of slashing high-level executive expenditures."

A CIO formerly with a multibillion-dollar consumer-goods firm, who requested anonymity, said that out of the 33 corporate officers at his former employer in 1985, only two remain.

CIOs often change companies. There are many statistics floating around regarding CIO turnover rates, but a new study of IS executives by Coopers & Lybrand puts CIO movement into the best perspective. C&L found that 24 percent of top IS executives have already held an average of three top IS jobs, and 35 percent have had more than three (see chart). IS executives who actually hold the CIO title are even more migratory: 51 percent of CIOs have had three or more jobs, compared to 31 percent of senior IS execs who hold the title of vice president.

consulting, like myself. Very few go into other functions."

"To this point," agreed Harold "Pete" Bott, a senior partner with Andersen Consulting in Chicago, "there has not been a lot of switching to become line managers. But that seems to be changing." CIOs who were formerly general managers before taking over IS often move back to general management. Furthermore, said Bott, "many businesses are developing [independent IS] business units, which market software [developed internally]. Often, the CIO is placed in charge." This provides CIOs with a place to gain valuable experience as line managers, he said.

Becoming a consultant is a popular pipe dream among CIOs. Many ex-CIOs have turned up at consult-

ing organizations or hung out a shingle on their own. But, according to Bruce J. Rogow, executive vice president of the Gartner Group Inc. in Stamford, Conn., most CIOs won't make it as consultants.

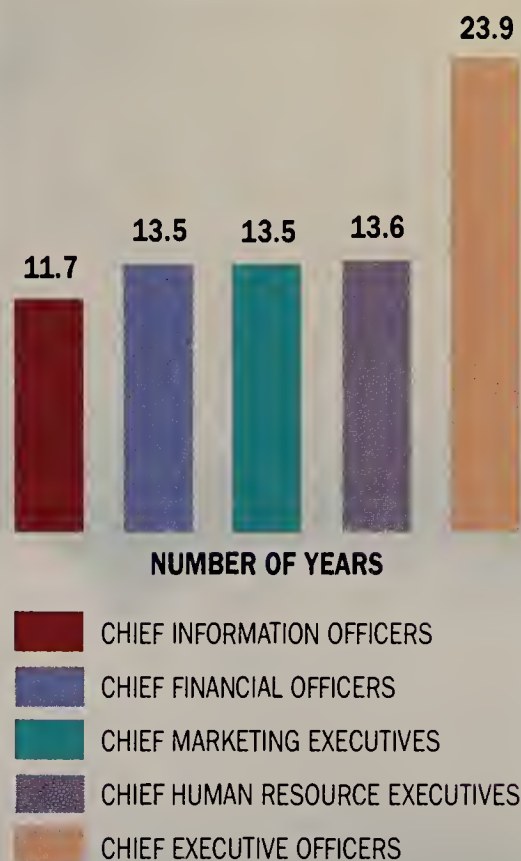
"Here's the truth no one likes to hear," said Rogow: "I know very few line managers or CIOs who are qualified to be consultants, unless they were consultants earlier in their careers. The reason is that the smallest part of being a consultant is offering their perspective and giving advice. The largest part is getting business and being billable."

According to Rogow, most CIOs don't appreciate this part of consulting life, don't enjoy it, and aren't good at it.

—A. E. Alter

TURNOVER TAKES

Executive Longevity with Current Employer



Source: Heidrick and Struggles Inc.

Are CIOs more prone to migrating than other executives? Once again, comparative statistical evidence does not exist; but it's safe to say CIOs are not alone. For example, recruiters who specialize in placing marketing executives said these managers change companies at all stages of their careers. According to Dennis Cott, a principal of The Maxwell Group Inc. in Aurora, Ohio, marketing executives at large companies may grab an opportunity to run a smaller company, take a job in a more desirable city, or simply make a lateral move to do something different. "How many different ways can you market Ivory Soap?"

The controversy begins with the need to make sense of CIO migration at a time of widespread managerial turmoil and business change. And in this debate, CIOs tend to take one side and recruiters and consultants the other.

In most cases, the CIOs we spoke to claimed that CIO turnover, while it may be high, is not different from that of other executives. "I'm not certain it's all that different in other



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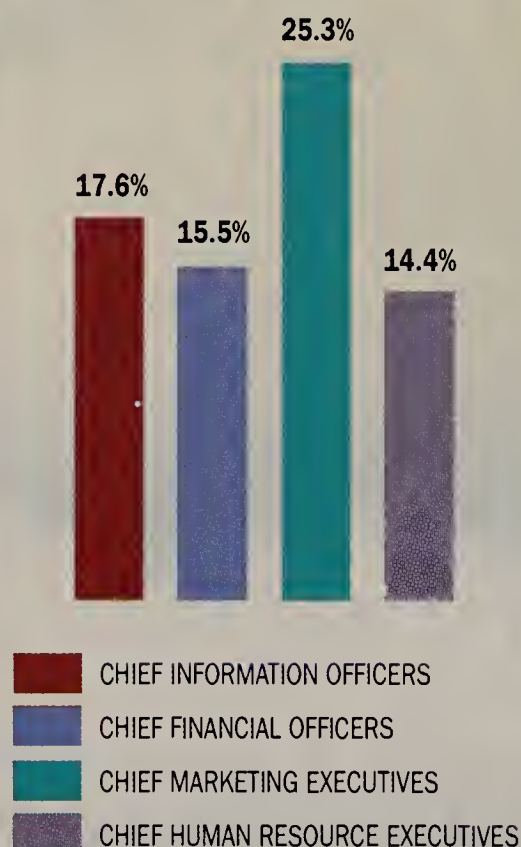


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TURNOVER TAKES

Percent of Executives Holding Current Post Less than Two Years



Source: Heidrick and Struggles Inc.

positions," said the anonymous former consumer-goods IS executive. "We're part of a general change in the way businesspeople change careers. I think any turnover due to lack of breadth or business leadership among CIOs is almost a thing of the past."

"I don't think [turnover] is peculiar to CIOs," said Gaughan. "This is an issue that affects all corporate executive positions today, what with the volatility of American business."

Executive recruiters and consultants—again, there are exceptions—generally cite a range of reasons for CIO turnover. But the one they tend to emphasize, especially recruiters, is that CIO turnover occurs when CEOs conclude that their IS chiefs are failing to meet expectations.

"The reason we get called in by the CEOs is that the [head of IS] has lost touch with the needs of the organization," said Dwight E. Foster, executive managing director of Foster Partners, a New York-based executive-recruiting affiliate of KPMG Peat Marwick. "The guy hasn't developed an internal clientele. CEOs want

someone to assess the environment, work with senior management, and provide some real leadership on how to spend this money [on information technology]."

According to John M. Jacobs, a group vice president with Temple, Barker & Sloane Inc., a management-consulting firm in Lexington, Mass., "the majority of senior IS executives are asked to leave jobs because of an inability to communicate with senior management over results. They are not results-oriented. Since management is so bottom-line driven, it creates a gap."

"The CIO is clearly the most troubled position in the executive suite," said H. Thaine Lyman, the Midwest director of information technology consulting for Deloitte & Touche in Chicago. An important reason, he said, is that "the CEO has very high expectations and is interested in getting a lot accomplished through technology. At the same time, [CEOs] almost feel they are held hostage by technology, because of high costs in the systems area. One of the top five issues for the CEOs of our major clients is whether they are doing the right things in the systems area."

What you are hearing is the sound

ing the complaints of the disgruntled CEOs who hire them.

Certainly, not every CIO is up to the difficult demands of the job. And as Bruce J. Rogow, executive vice president of the Gartner Group Inc. of Stamford, Conn., said, not every company that hires a CIO finds it really needs one. But, although CEOs hire and fire CIOs, it is a mistake to maintain that this indicates the entire position is in jeopardy. Recruiters, consultants and practitioners all agreed that CIOs are not having problems finding new CIO positions. "I think the CIO position is becoming a more stable place, because we're getting a higher quality person in there," said Norman D. Sanders, managing director of the information systems practice of Russell Reynolds Associates Inc. in New York. "Most of my clients are CEOs. We're not hearing, 'the CIO doesn't seem to understand our business' as much as we used to."

When CEOs switch CIOs, it doesn't necessarily mean that something is wrong with the old CIO, said James A. Champy, chairman and CEO of the Index Group Inc. in Cambridge, Mass. It often means that the company needs a CIO with

"Non-technical senior management are looking for people who can get in and change the technical world. But they don't know they really have to change the organization and the business processes along with it."

—Ron Brzezinski

of someone's ox being gored. If CIOs sound defensive, no wonder. They've watched their fellow executives and fellow IS managers lose their jobs, and seen their position come under intense scrutiny, and even attack. And if recruiters and management consultants harp on CIO failure, it's no surprise. After all, they are echo-

different skills.

Harold "Pete" Bott, a senior partner with Andersen Consulting in Chicago, concurred. Because the role of an IS executive is changing, he said, changing "skills and talents required in the role mean different people will be appropriate." As both Champy and Bott foresee more change ahead

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TURNOVER TAKES

Percent of Executives Holding Current Post Less than Six Years



Source: Heidrick and Struggles Inc.

for the CIO role, they anticipate that turnover will continue, too.

It is also a mistake to jump to the conclusion that if a CEO is dissatisfied, the CIO is solely to blame. The failure to manage the IS function well is a dual failure of the CIO and the CEO, said Jacobs.

One of the reasons the CIO job is nearly impossible is that executives and users remain technologically ignorant in the Information Age. So said Colin Palmer, former IT director at British vacation tour operator Thomson Holidays, now a consultant based in the London suburb of Rickmansworth. "They have not grasped what needs to be done [with IT] and the way information systems and technology need to be managed. A tremendous gap in understanding has arisen." Jacobs also spoke about senior management's lack of knowledge regarding the IS function: "CEOs have to become more educated in the use of IT."

The CIO is the newest position in the executive pantheon, explained just about everyone we spoke with.

What does that mean in practice? "People are not quite certain what the CIO job entails," said William R. Synnott, director of the banking technology center at Nolan Norton & Co. in Lexington, Mass. "It's not clearly understood at senior management levels—even by CIOs."

CEOs who do not clearly understand the CIO job, or their company's particular technology management requirements, are open to a host of errors.

They may hire a new CIO for the wrong reasons. "Non-technical senior management are looking for people who can get in and change the technical world," said Ron Brzezinski, former vice president of IS at the Quaker Oats Co. and now a consultant at Coopers & Lybrand in New York. "But they don't know they really have to change the organization and the business processes along with it." Or, as Synnott said, the CEO may install a non-technical manager who can't keep up with the technology. "What they underestimate is [that] it is difficult to be a technology leader if you don't understand the technology."

The CEOs may not grasp the politics of technology. "CIOs are in charge of trying to implement change, and change is a very difficult thing to implement in large companies. There is a lot of resistance," said Gordon P. Smith, senior vice president and CIO of the Equitable Life Insurance Society in New York. Often, the CIO is unable to "muster the necessary forces to get the job done. This leads to disappointment and disillusion about what can be done."

One reason may be that "the CEO has not completely thought through what he or she wants to do with the job," said Norman L. Phelps, chairman and CEO of National Liberty Corp., a Valley Forge, Pa.-based insurance company. "Sometimes the CEO has the CIO report too low in the organization, so it becomes a change agent job without enough senior-level support."

Perhaps, Brzezinski pointed out,

the fact that most new CIOs are hired from outside rather than promoted from within the company has something to do with this failure. These outsiders have "fresh views on technology and virtually no experience on that company's culture and internal operations. You are asking these people to become extremely effective change catalysts fast, yet they are not much of a part of the organization."

According to Brzezinski, CIOs have three to five years to orchestrate major change in an organization. When a CIO is hired, managers may happily greet the new IS chief as someone who will change things for the better. But if the company remains stuck in a rut, other line executives start to blame the CIO for many of their organization's prob-

"They [executives and users] have not grasped what needs to be done [with IT] and the way information systems and technology need to be managed. A tremendous gap in understanding has arisen."

—Colin Palmer

lems. At this point, said Brzezinski, CEOs should reorganize the company to take away the excuses of line managers. Instead they usually have the CIO's head.

In short, CEOs who blame CIOs for not managing technology well should also take a good hard look at themselves. And CIOs and CIO wannabes who wish to make a career as information executives need to take a

TURNOVER TAKES

CIO Turnover at Fortune 1000 Companies

Between January 1989 and July 1990, 76 out of 250 Fortune 1000 companies called by *CIO* magazine had replaced their former head of IS with a new head of IS. That makes for a 30.8 percent turnover rate for 18 months. (Names of January 1989 CIOs come from the *Corporate Finance Bluebook*.)

hard look at the consequences of their choice of careers.

Anyone who becomes a CIO today must accept that there are powerful forces that will probably compel them to migrate from company to company. Said the former consumer-goods company CIO, "We as a profession are recognizing that not unlike many other functional specialties, you no longer have a career in a company." When CIOs negotiate over their compensation these days, he said, "I expect less attention is paid to retirement perks and more is given to incentive plans, stock options, and even base compensation. I don't think many CIOs these days expect to spend enough time with a company to achieve any kind of retirement benefits."

CIOs and their families will also have to pay a personal price, said Brzezinski, in the form of disruption and uprooting.

What's more, he observed, the Coopers & Lybrand survey found that the average age of the CIO is now 47 years old—the oldest it's ever been. "If turnover continues to happen," he explained, "it's going to be a lot more personally destructive. As long as the average age of CIOs was the late 30s and early 40s, people were very marketable. But if the average age is going up, turnover can be more personally destructive. That will be a real problem.

"Unless they wanted to live in a high-risk mode," Brzezinski concluded, "if I had to pick a position I wouldn't want my kids to take, it would be the CIO position." 

Our Cover Story

We want to nip this jinx thing in the bud . . .

Is it slowly becoming a myth—like the old yarn about alligators roaming the sewers of New York—that CIOs who appear on our cover soon become ex-CIOs? A student at the Harvard Business School called us one day to report that a professor of his told a B-school class that there is a *Sports Illustrated*-type jinx associated with appearing on our cover.

As it turns out, however, gracing the cover of *CIO* is far from being a kiss of death. Out of the 23 CIOs (or functional equivalents) who have appeared there, six have moved on to new jobs. And they are doing quite nicely, thank you.



Ronald T. Brzezinski
September/October 1987

Then: Vice president of information systems, the Quaker Oats Co., Chicago
Now: Consultant (partner), Coopers & Lybrand, New York



Joseph Campbell
April 1988

Then: Chief information officer, Dollar Dry Dock Savings, White Plains, N.Y.
Now: Senior director and vice president, Citibank, New York



Richard D. Koeller
August 1988

Then: Vice president of information systems services, TRW Inc., Cleveland
Now: Vice president of information technology, Whirlpool Corp., Benton Harbor, Mich.



Colin Palmer
February 1989

Then: Deputy managing director, Thomson Holidays, London
Now: Independent consultant, Rickmansworth, Hertfordshire, U.K.



John Owens
May 1989

Then: Vice president of IS, Sara Lee Hosiery, Winston-Salem, N.C.
Now: Vice president of IS, Carrier Corp., Farmington, Conn.



Jerome F. Trautschold Jr.
October 1989

Then: General manager of the systems and computer services department, Mobil Corp., New York
Now: Controller, Mobil Corp., Fairfax, Va.

In addition, American Standard's Gary Biddle (March 1988) and Schwinn's Robert Walsh (December 1988) have had title changes and taken on enhanced responsibilities at their respective companies. —M. Santosus

Building a global communications network is an enormous undertaking. The builders need to know not only where (and what) to build or buy, but how to collaborate and operate internationally as well

NETWORKING'S WORLD BEATERS

BY MEGHAN O'LEARY

Globalization is like art: The concept is great, but the road to the finished product is long, difficult and frustrating.

CIOs who are trying to take their networks global face myriad obstacles: a massive investment to justify, unreliable or nonexistent public networks in many countries, uncertain technical standards, cultural gaps and regulatory obstacles.

"The problem you've got in building global information technology capability is [that] business is still unclear about how it's going to globalize," said Peter Keen, president of The International Center for Information Technologies (ICIT), a management education consulting company in Washington. Businesses are still deciding whether to regionalize manufacturing or globalize sales. They're still learning to act like global entities.

The time and money investment a company makes to a global network often signifies a cultural decision to improve communication across bound-



ANDREW ZIMMERMAN: the "right resources" instantly on tap

HARTMUT BURGER presides over the EDS



Corp. global network, only half of which is devoted to the networking needs of General Motors, EDS's parent.

"The more you distribute power and decentralize, the more important the network becomes. One of the biggest advantages to the networked society is that you don't need all those filtering organizational hierarchies anymore."

—Hartmut Burger

aries of the corporation. General Motors Corp., which has operated globally for years, decided that it needed truly integrated global communications as a strategic tool for the 21st century, according to Hartmut Burger, president of Technical Infrastructure Services for EDS Corp. in Dallas. EDS was responsible for consolidating GM's network and expanding the user base. (A wholly owned, non-consolidated subsidiary of GM, EDS manages the GM network and views GM as a customer. The GM network makes up one half of EDS-NET, EDS's own global network.)

Like other globally networked companies, GM uses electronic mail and video conferencing to improve the flow of information between widely dispersed business units while saving time and travel expense. For companies as large as GM, an additional emphasis is placed on direct communications that allow decisions to be made with fewer layers of management.

GM's network allows it to design cars in Germany (known for its fine engineering), assemble them in Korea (which offers cheap labor) and sell them in America (famous for its consumer spending). Such a feat

The Totally Mobile Phone

Motorola is developing a worldwide cellular telephone network that frees users from the regional ties of current technology

Networking is as easy as picking up a telephone in North America, but in other parts of the world, the connectivity is somewhat under-realized. Motorola Inc. is hoping to remedy that with a worldwide cellular low-orbit-satellite phone network.

Called Iridium, the network will rely on a constellation of 77 (the atomic number of the element iridium) low-orbit satellites around the world, main-frame gateways in major cities, and hand-held cellular phones. It will handle both voice and data at 2,400 bps per channel, and channels can be combined for high-capacity transmission. According to Durrell Hillis, corporate vice president and general manager of satellite communications at Motorola's office in Chandler, Ariz., the company envisions a "truly ubiquitous personal communications device that [will let] you . . . communicate from [and to] any point in the world."

With Iridium, the user will turn on the phone and transmit a signal to his or her home gateway via the nearest satellite. The gateway has information on the user's account and service options. The system will store the user's last known location and send calls to his or her number there.

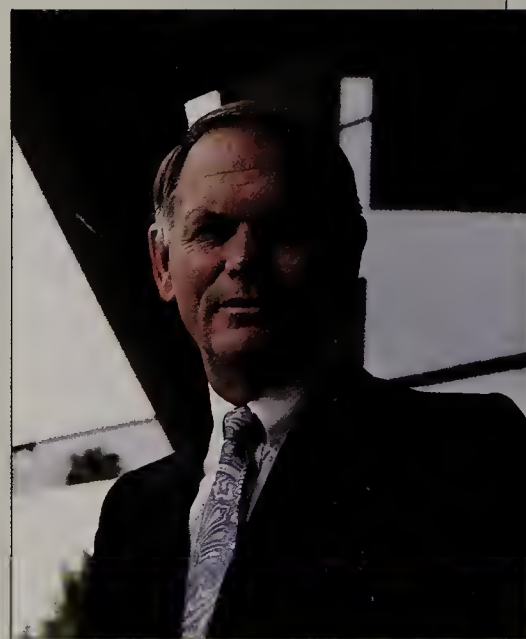
The network holds a great deal of promise for companies that wish to set up business in areas where telephone and transmission services are spotty or nonexistent: industrialized countries such as Canada and Australia where certain regions are sparsely populated, or undeveloped countries such as India where 600,000 villages currently have no telephones.

Motorola is currently in discussion with cellular communications providers throughout North America, Europe and the Pacific Rim. Major corporations around the world have also expressed interest in the project, Hillis said. The company expects to have firm agreements with all parties by the end of this year and will begin launching its constellation of satellites in 1994. Services will be available by the end of 1996.

Hillis points out that the high cost of using the network makes it an unlikely substitute for currently available terrestrial networks. The individual phone units will sell for \$3,000, and service will cost about \$3 per minute. Still, in areas such as India's 600,000 phoneless villages, cellular telephone booths make economic sense. "In India, they've estimated that to wire up their country through conventional means would cost \$50 billion," Hillis said. A cellular phone booth network would cost about \$5 billion.

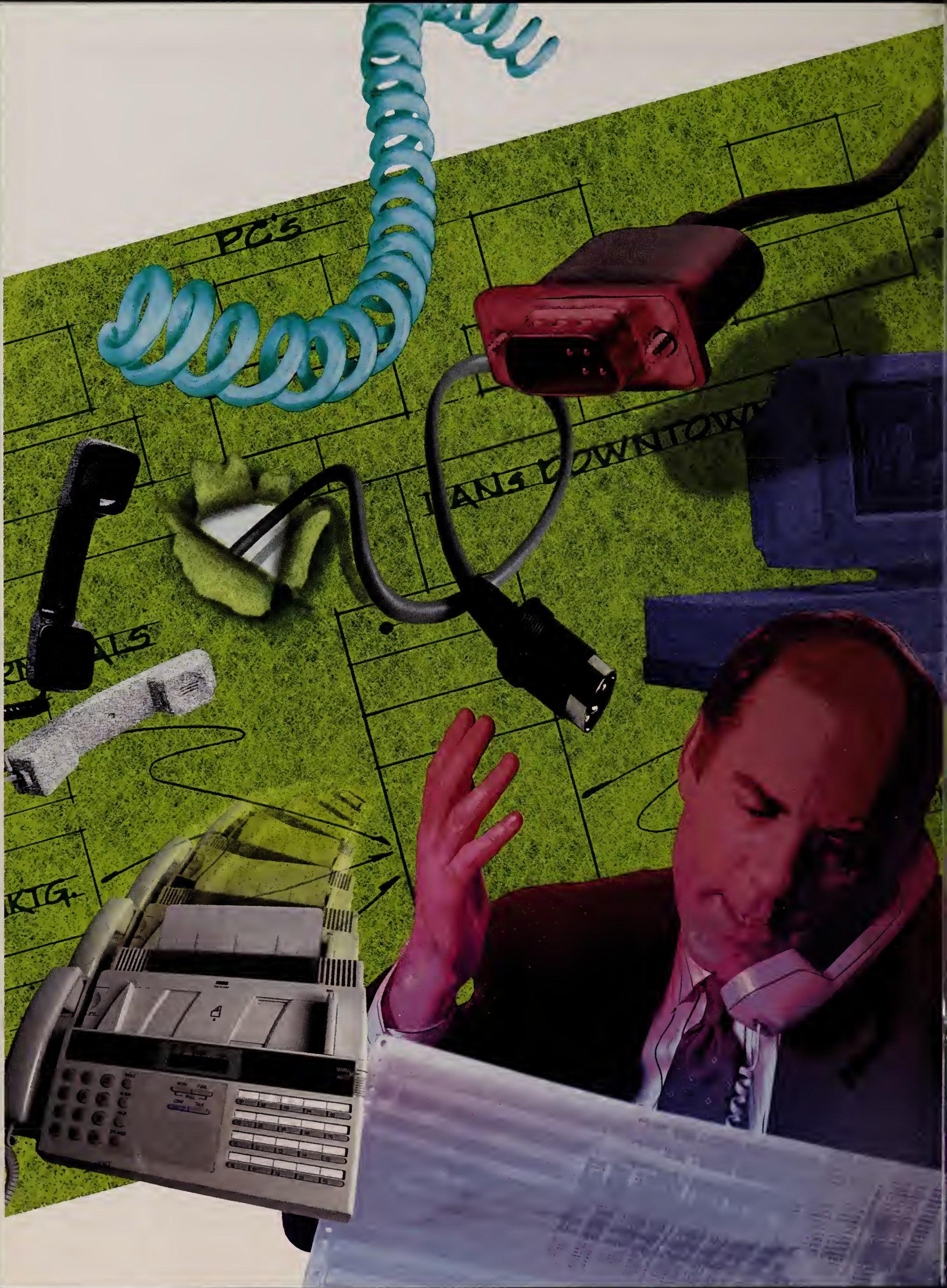
Hillis stresses that Iridium fills a gap and won't compete with currently available mainstream telecom services. Still, he points out the unintentional symbolism in the network's name. Amateur geologists who subscribe to prehistoric meteor-crash theories will be familiar with it: Iridium wiped out the dinosaurs.

—M. O'Leary



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MICHAEL KENNEDY: *Although expanding choices enable companies to "build a network that suits [their] individual needs," they also can "really screw things up and be responsible."*

would be impossible without a global network, Burger pointed out. "You couldn't even think about being a cohesive company. The more you distribute power and decentralize, the more important [the network] becomes. One of the biggest advantages to the networked society [is that] you don't need all those filtering organizational hierarchies anymore."

Volvo GM Heavy Truck Corp., in Greensboro, N.C., is setting its

stage for global design and manufacturing with an international CAD network that allows the company's worldwide design teams to function as a cohesive unit, according to Doug Maston, manager of corporate CAD support. (The company was formed when Volvo White Truck Corp. merged with GM's heavy truck division. It is 75 percent owned by Volvo; GM is considered an investor.) Shared design data helps to cut

design time by eliminating redundant effort and sharing expertise across the United States, Sweden and Belgium. Scotland, Brazil and Australia will go online this year. "It was set up with the idea of dispersing the workload," Maston said. "It's a matter of competing in a world market. The company that doesn't have CAD designs in the world market isn't going to be able to stay abreast of [the competition]."

The planning report is stuck in accounting.

Sales data are still out in the field.

Inventory figures are stored at 1200 different sites.

The competition is on our heels.

Now tell me why our computers can't work

together.

Integrated information from to give you control by giving

It is

a comprehensive

It is a truly open

initiative

It is

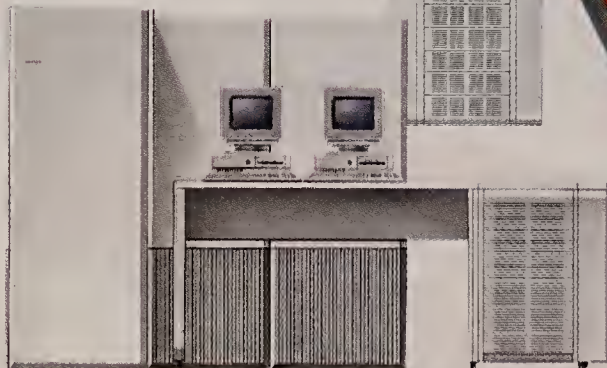
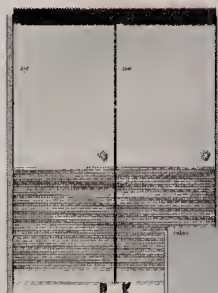
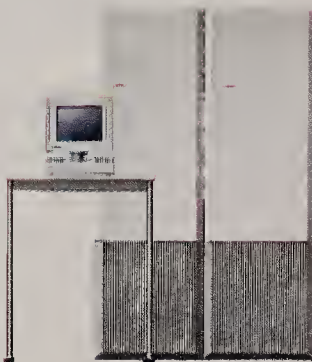
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so broad you're free to integrate information

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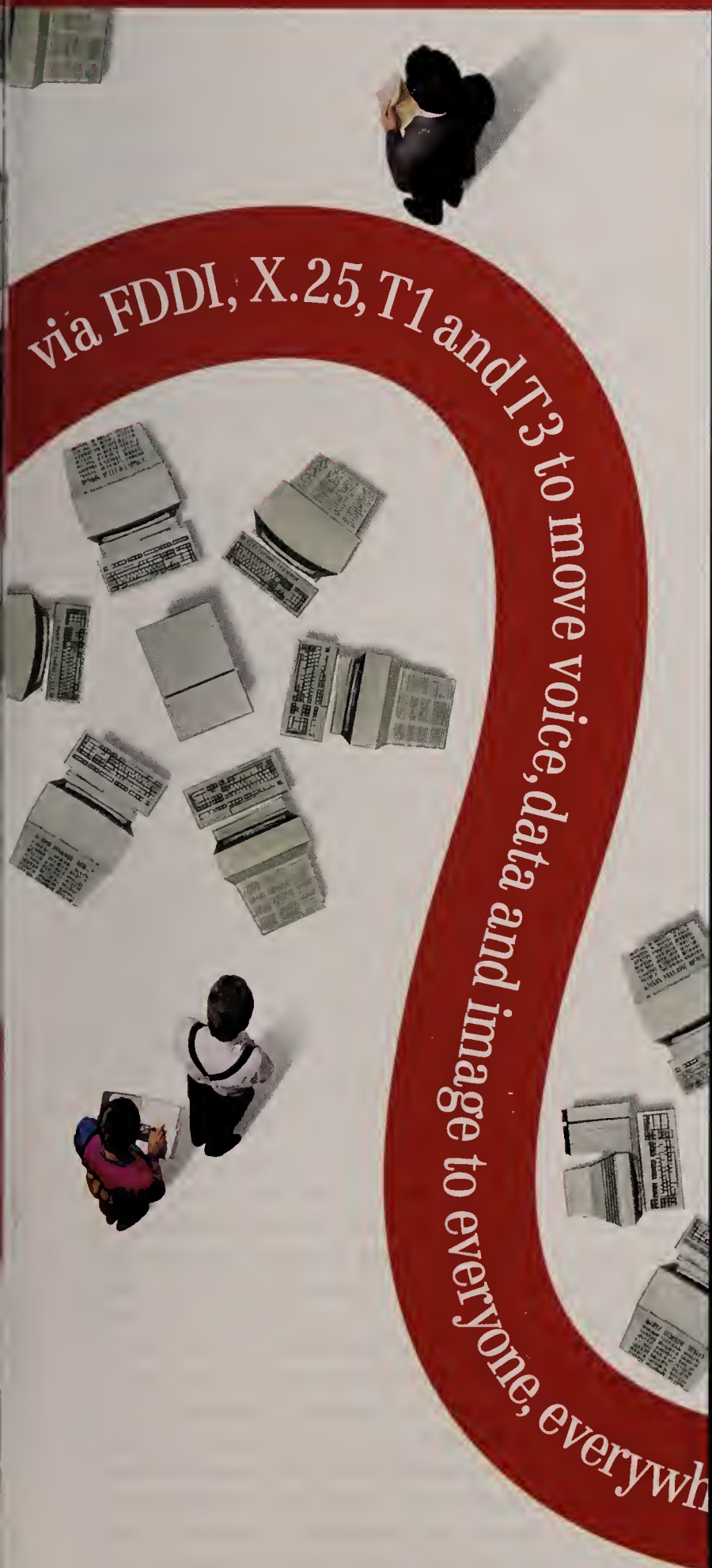
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We make it happen

The New York-based consulting and accounting firm Coopers & Lybrand built a global network to make it easier to share information and expertise across disciplines as well as geographies, according to Andrew B. Zimmerman, a partner in the national office who headed the network project. The company consults on tax issues, management and high technology. Its network allows a partner in the United Kingdom who is proposing a tax audit and consulting services to a global airline reservation company to get input from American partners who may have more experience with such companies.

"Through that sharing of information . . . we can bring the right resources to a client situation, or we [can] bring things together more efficiently," Zimmerman explained. Zimmerman believes that the company's network gives it an edge in addressing industries that are more global, such as financial services, while allowing it to deal more effectively with local issues, such as taxes.

No matter how compelling one's organizational prerogatives, however, the grim reality is that electronic communications facilities are limited or unheard of in many areas of the world. Businesses have three choices: buy, make or forget it. "It depends on the corporation," said Thomas J. Mercer, a principal with Booz-Allen & Hamilton Inc.'s Commercial Telecommunications Practice in Bethesda, Md. "If their lifeblood is networking to deliver products and services, then they'll build their own." But a private satellite, fiber-optic or microwave network is prohibitively expensive for many companies. (In fact, private networks are expensive enough that many countries can't afford them.) Those companies that decide to rely on local public facilities overseas should be forewarned, Mercer said. "It's faster to jump on a burro and deliver a message than pick up a telephone in some countries."

The majority of companies will find that communicating in some areas of the world requires a hybrid ap-

proach—using a combination of private lines and public switched services. Global market watchers agree that many of the decisions surrounding international networking must be made on a country-by-country basis, while decisions about connectivity between countries require a centrally focused committee with representatives from each nation.

"Traditionally," said Mercer, "[when those who have] the top responsibility for networking the users . . . try to take mandates for their goals and objectives to another part of the world, they meet instantly with a conflict—'Here comes America to

No matter how compelling one's organizational prerogatives, the grim reality is that electronic communications facilities are limited or unheard of in many areas of the world. Businesses have three choices: buy, make or forget it.

tell us what to do, and they don't even know the service offerings.'" Global communications require collaboration across boundaries.

Ultimately, a competitive marketplace will even out tariffs, said Keen. Liberalization of foreign telecom markets is a business decision, he said. "There is no Fortress Europe; there is a business Europe that wants to do business."

For now, foreign telecom costs will determine where American compa-

The Globe at a Glance*

REGION	VOICE SERVICES
United States	LECs, RBOCs, inter-exchange carriers (AT&T, MCI, Sprint)
Western Europe	Local PTTs
Pacific Rim (Japan, SE Asia, Korea, Singapore, Hong Kong, Australia)	Local PTTs
Asia	Local PTTs
Eastern Europe	Sporadic local PTTs
Latin America	Local PTTs
Africa	Sporadic local PTTs
*Although various regions contain isolated exceptions, characterizations are of overall capability.	
SOURCE: IDC COMMUNICATIONS SERVICES	

nies establish their back offices. "The main reason for putting [our data center] in Sweden was economic," Volvo's Maston said. "We were looking to take advantage of [Volvo's] programming and the reduced cost of telecom hardware and software" in Sweden.

Those companies that choose their public communications options carefully often find the task of dealing with foreign carriers to be manageable and even beneficial. Coopers & Lybrand chose to let its foreign offices arrange local connections with local vendors for two reasons: As a highly decentralized multinational company, Coopers & Lybrand didn't want to put the time or money into over-centralized network management or cost accounting; and international service vendors typically will not handle itemized billing to the end user, Zimmerman said.

The debate over network management at the General Electric Co. of Fairfield, Conn., had almost become an argument when the company decided to rely on foreign companies to install and support GE-owned lines and to interface them with the local networks, according to Stanley M. Welland, GE's manager of corporate

ADVANCED VOICE CAPABILITIES	LOCAL DATA	WIDE-AREA DATA	VOICE/DATA INTEGRATION
Sporadic, primarily handled by customer premise equipment (PBXs), messaging, DID, call store & forward, emerging ISDN	Ethernet (802.3), Token Ring (802.5), Token Bus (802.4)	X.25, T-1, T-3, modems, multiplexors, moving to 802.6 & SONET	1994?
BRI ISDN	Ethernet, Token Ring	X.25, packet-switching	1993-94
Intelligent buildings, messaging, call store & forward, ISDN	Hybrid ISDN	Mix of T-1, T-3, X.25, ISDN	1991
None	Limited Token Ring	Very limited ISDN	1994-95
None	Proprietary	None	2000?
None	Limited Token Ring	None	2010?
None	None	None	2050?

Setting up a global network can be a daunting prospect under the best of circumstances. In areas where service exists, standards and tariffs are wildly divergent from country to country, and liberalization of the telecom industry is experiencing some difficulty. The discussion of standards across international borders takes on a religious fervor and an element of fantasy in Europe, according to Peter Keen, president of The International Center for Information Technologies (ICIT), a management education consulting company in Washington. Western Europe and certain Pacific Rim countries are further down the road with ISDN and OSI than the United States. And while 70 percent of French phone subscribers are connected to digital exchanges, only about 10 percent of Germans are. The Brazilian government gets 99 cents for every dollar spent on telecom there. Britain has the lowest telecom tariffs in the world; Switzerland has some of the highest (10 times average U.S. prices). France and Germany have very restrictive technology. Koreans want to open up telecom, but they want to protect their domestic switch markets, which are very strongly unionized. In Argentina, companies actually hire people to sit and get a dial tone.

telecommunications. "I was a big supporter [of the idea] and thought the language and culture problems could be ironed out," Welland said. "And that turned out to be exactly what occurred."

Companies that choose not to rely on foreign PTTs have few cost-effective alternatives for service. One of these is a private satellite network. Volvo GM opted for a VSAT network because it was cheaper and more reliable than a terrestrial one. The company is currently replacing some of its remaining cable with a larger satellite network (an adjunct to the

less-powerful VSAT network). The new network will link its American facilities with Sweden via a 512K channel that carries voice, data and video-conferencing.

Charles Fitts, manager of corporate MIS, emphasizes that cost is becoming a bigger issue for Volvo GM as worldwide network traffic increases. The satellite network will allow the company to quadruple its bandwidth while only doubling its cost.

Cost was a key factor as well in EDS's decision to link its U.S. operations and its European and Pacific

Rim offices via satellite. EDS found that many of GM's communications needs were one-way and could be accomplished through satellite broadcasts rather than by using expensive leased lines to connect its offices around the world and its more than 10,000 U.S. dealerships.

Some companies worry about sacrificing speed and availability for low cost, however. General Electric moved from a private voice network to a hybrid network—that is, a combination of dedicated lines and a virtual software-defined network—to link its American, European, Pacific Rim, Latin American and Middle

Many of the decisions surrounding international networking must be made on a country-by-country basis, while decisions about connectivity between countries require a centrally focused committee with representatives from each nation.

Eastern operations. The network allows GE employees to communicate via voice or data across international boundaries by dialing only seven digits. Engineers can share information and inquiries across borders, and GE employees will soon have worldwide video teleconferencing.

The level of communication and competitiveness that GE was striving for precluded any tradeoffs on quality, according to Welland. Still, the company did realize some cost sav-

Take away his writing his music and he country doctor. In his



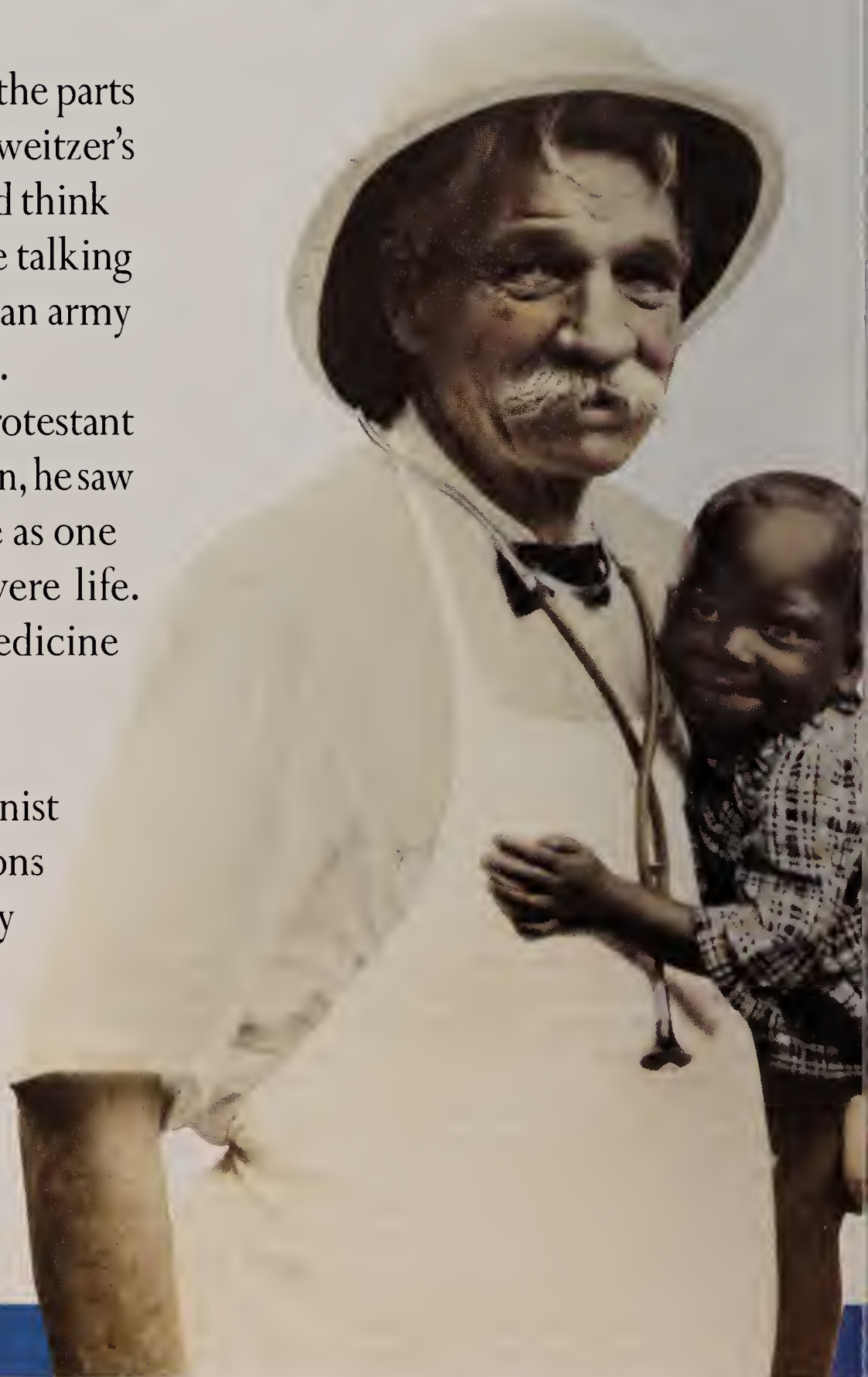
Add up the parts
of Albert Schweitzer's
life and you'd think
you were talking
about an army
of men.

As a Protestant
theologian, he saw
medicine as one
way to revere life.

So he studied medicine
and went to work in French
Equatorial Africa.

As a classically trained organist
renowned for his interpretations
of J. S. Bach, he raised money
for his hospital by giving
concerts.

As a philosopher and
writer he was renowned
for his prodigious work,
The Philosophy of Civilization,



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his philosophy, and was just another case, a whole country.

and used the royalties to purchase medical supplies.

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DOUG MASTON (left) and CHARLES FITTS: Global CAD is an absolute competitive necessity.

Companies that choose their public communications options carefully often find the task of dealing with foreign carriers to be manageable and even beneficial.

ings. While private lines were necessary in many areas overseas, cheaper U.S. public lines proved to be reliable enough to carry voice traffic. Overseas, the software-defined networks allowed GE to minimize new hardware purchases by upgrading old equipment instead of replacing it.

For many companies, the choice between laying their own lines and leasing publicly available services comes down to how much of their own resources they're willing to put into managing and supporting the network. The fiber that remains in GE's network is the most difficult aspect of the net to maintain, according to Fitts.

Overwhelmed by the number of choices (and underwhelmed by the quality of the offerings) in services overseas, businesses may opt to put network responsibility into the hands of a third-party service provider. "If I were a CIO, my major problem would be how do I get all the functionality of a custom, private network . . . without having to hire someone and put them in every part of the globe to babysit the network," said Peter Bellini, a marketing representative in the Commercial Services Division of Infonet in New York. Infonet, which is owned jointly by a group of European PTTs and MCI Communications Corp. (see "The

Network Value-Mart," Page 22), runs an international value-added data network that extends to 34 countries. "What has really sold the powers-that-be [on this concept] was the capability of having access and ownership and having the best of what both of those terms imply." Access without responsibility for the network itself seems to be a sound selling point. Infonet currently enjoys 37 percent of the world market for private data-network services, according to Bellini.

In addition to its value-added network, Infonet sells the much-lauded but little-realized concept of one-stop shopping. "There are so many arbitrary restrictions and regulations and massive differences in costs [between countries]," ICIT's Keen pointed out. "Businesses want to go to one place and get the lot."

Whatever their choices for services, not every company looks at total global rollout as a priority. Some prefer to build a network foundation in areas where services are available

Nobody should try to give glib answers, because this is an issue of how do you manage not to make dumb choices. Everyone is trying to buy time."

—Peter Keen

and reliable, according to Coopers & Lybrand's Zimmerman. "We've been focusing on the countries that you'd imagine tend to have a better infrastructure," he said. In the meantime, the company's offices in less developed countries such as Latin America and Asia can dial into the private network and download information—when they can get access lines. While this is a less-than-optimal use of the system, it is as much as C&L is willing to invest in its network right now.

Tentative approaches to networking are indicative of the obvious risk of investing in an uncertain technical future. Now that users and suppliers are pushing the world telecommunications market to open up, a lot of businesspeople are faced with choices where there used to be none. "Now you [can] save money and build a network that suits your individual needs," said Michael Kennedy, head of corporate networking for Arthur D. Little Inc. in Cambridge, Mass. "The bad news is that now you can really screw things up and be responsible."

"Nobody should try to give glib answers," agreed ICIT's Keen, "because this is an issue of how do you manage not to make dumb choices. Everyone is trying to buy time."

Still, Keen stressed the need to formalize plans for globalization. "You've got to have a philosophy around the global organization," he said. "It's amazing how many companies have more than 50 percent of

That Certain Je Ne C'est Quoi

The CIO with global responsibilities must have good executive skills and a cosmopolitan outlook

As corporations extend their international reach, CIOs are finding that they must broaden their skills—and their visions—to become more cosmopolitan.

The CIOs of major multinational corporations are not being hired primarily for their technical capabilities anymore, according to Thomas J. Friel, managing partner of the worldwide information technology practice of Heidrick and Struggles Inc., an executive search firm based in Chicago. "We're seeing CIOs being selected for major corporations who are not technically competent to do any of the jobs that report to them," he said. More important than technological proficiency, as Friel sees it, are good "executive skills" and an openness and sensitivity to other cultures.

"They need the same skills as their [counterparts] on the executive committee," he said: global vision, executive ability and cost-management expertise. "Information executives who have those skills have unlimited upside in terms

of career potential." However, he added, "a lot of this is personality- and sensitivity-driven. It's not easy to make somebody a globally tuned executive. It requires the attitude to do it."

Friel believes there is extra pressure on CIOs to be global thinkers because they are trying to create a global platform on which other business functions must rely. Creating a successful global platform requires a CIO who knows where tight controls are needed and where things can be a little looser. "If a major multinational is going to have an effective communications network, standards have to be in place everywhere," he explained. "That doesn't mean that the same manufacturing cost-accounting system has to be in place everywhere."

A global CIO must also be a good money manager. The price of international networking is "huge and growing," according to Friel. "Most CIOs that I know in major multinational firms really want to be selling services on the outside and running real profit-making businesses. [The challenge] is to get somebody who is far away, who doesn't report to you, who doesn't even report to the same guy you do, to pay for the technology and to do it your way."

Friel supposes that these complex requirements for global CIOs are a signal that the CIO is increasingly likely to be a key member of the executive management team in the future. "I think that is the real driver behind the need for global CIOs. If these other executives are dealing with issues on a global basis and their CIO is not, he's going to be left behind." —M. O'Leary

their business outside the U.S. and still think of themselves as domestic. You've got to realize that a transnational architectural platform is really a business policy question." The success of such a platform, he added, requires intense central coordination with as much decentralization as possible.

Those who have taken the plunge

are hooked. "The most important skill we developed was being able to shrug off the fear of doing something different," said GE's Welland. "I think the biggest handicap most of us have in this business is a fear of the unknown. Everybody . . . likes to sit back and watch somebody else do it first, but it's being out there in front—that's where all the fun is." CIO

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Electronic data interchange (EDI) is the Jekyll and Hyde of enterprise technologies. In the reasonable light of day, corporations as diverse as Alcoa, Wal-Mart Stores Inc., and Bergen Brunswig Corp. laud the advantages of a computer-to-computer exchange of business documentation such as purchase orders or invoices. Industry watchers cheer the growth of the EDI market; EDI spread the word!, a Dallas-based EDI publishing and consulting company, estimates that over 12,000 companies in North America now use some form of EDI technology (that's a six-fold increase since mid-1987). And market analysts predict that the boom won't slow anytime soon. Sales of EDI technology and services could grow from the half-billion-dollar market it is today to a near \$2 billion market by the mid-1990s.

But Jekyll is also Hyde. Look at the boom in the moonlight: The overwhelming number of companies adopting EDI technology today are doing so only because they have been coerced into it by a few score large customers. Corporations like General Motors Corp., K mart Corp. and AT&T have indicated directly or indirectly to their suppliers that EDI is fast becoming a prerequisite to doing business. Suppliers are grudgingly complying, but observers say that few businesses press-ganged into EDI are using the technology to run their own shops more efficiently. Rather, they are doing the minimum to keep their customers happy while maintaining the paper-based systems they know and trust. That is hardly a conversion to electronic business.

"The fast start of EDI was artificial," observed Dave Taylor, vice president and director of inter-enterprise systems at the Gartner Group Inc., an IT research firm in Stamford, Conn. He believes that fewer than 1,000 of the estimated 12,000 EDI users "really want to make EDI part of their business strategy. The rest are being dragged along."

This forced march to EDI "has had

BY TOM KIELY



a negative effect," Taylor continued. "The advantages of EDI are real. But if all you want is a tactical solution [to keep big customers happy], that's all you'll get. You'll spend a lot less money, but you'll get a lot less result." It is like creating a do-nothing job for your spouse's worthless cousin.

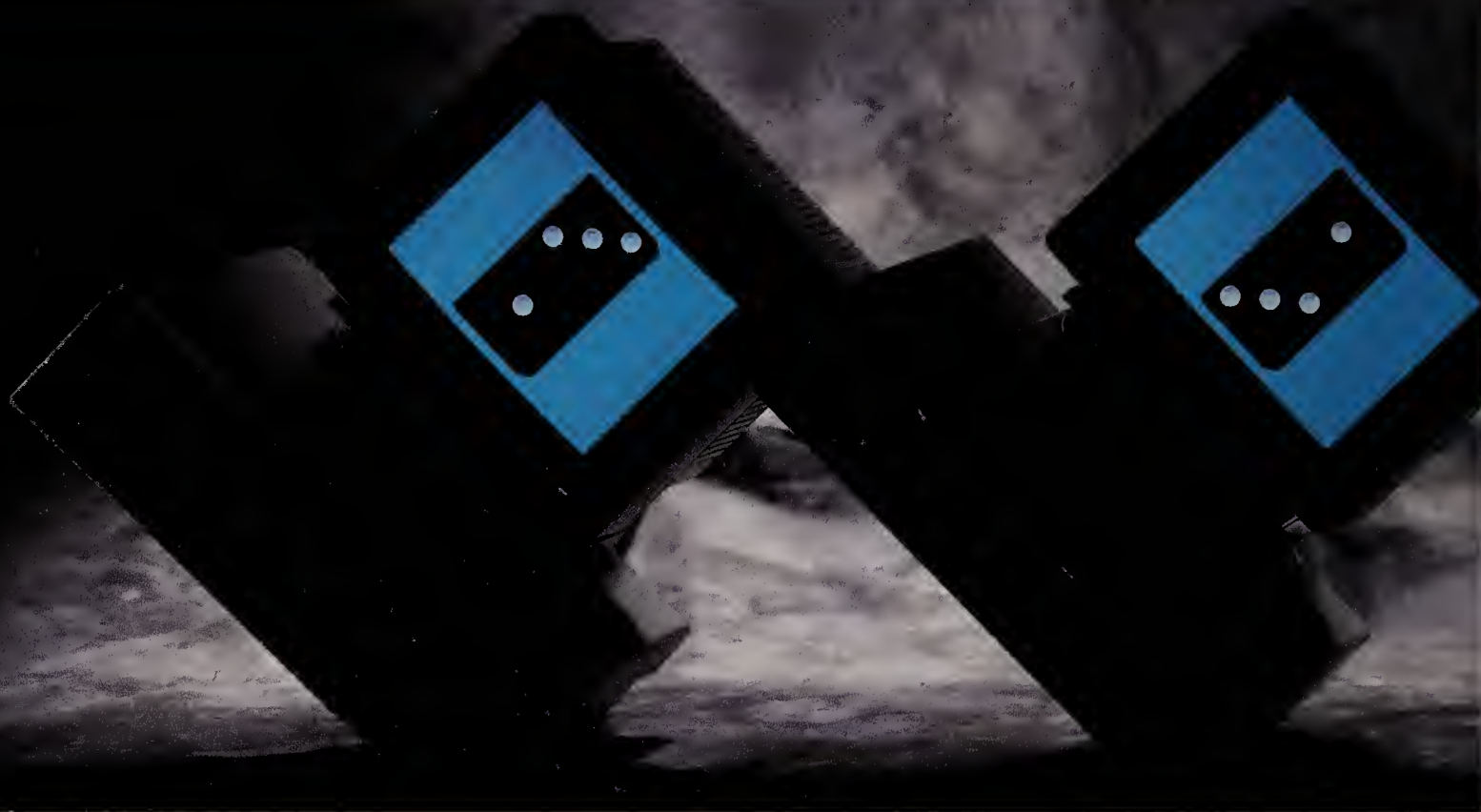
Others agree. "EDI is the first and only technology in the history of man that is being implemented for all the wrong reasons," declared Thomas

Costello, product marketing manager of Blue Bell, Pa.-based Unisys Corp.'s EDI program. "A supplier can physically make the connection and . . . move the data, but nobody has taught him how to use the technology to better his own business."

Still, the EDI pushers might be forgiven, at least in one respect. They are among the handful of large concerns that consider EDI technology critical to their operations—and

THOMAS COSTELLO: *EDI "is being implemented for all the wrong reasons."*

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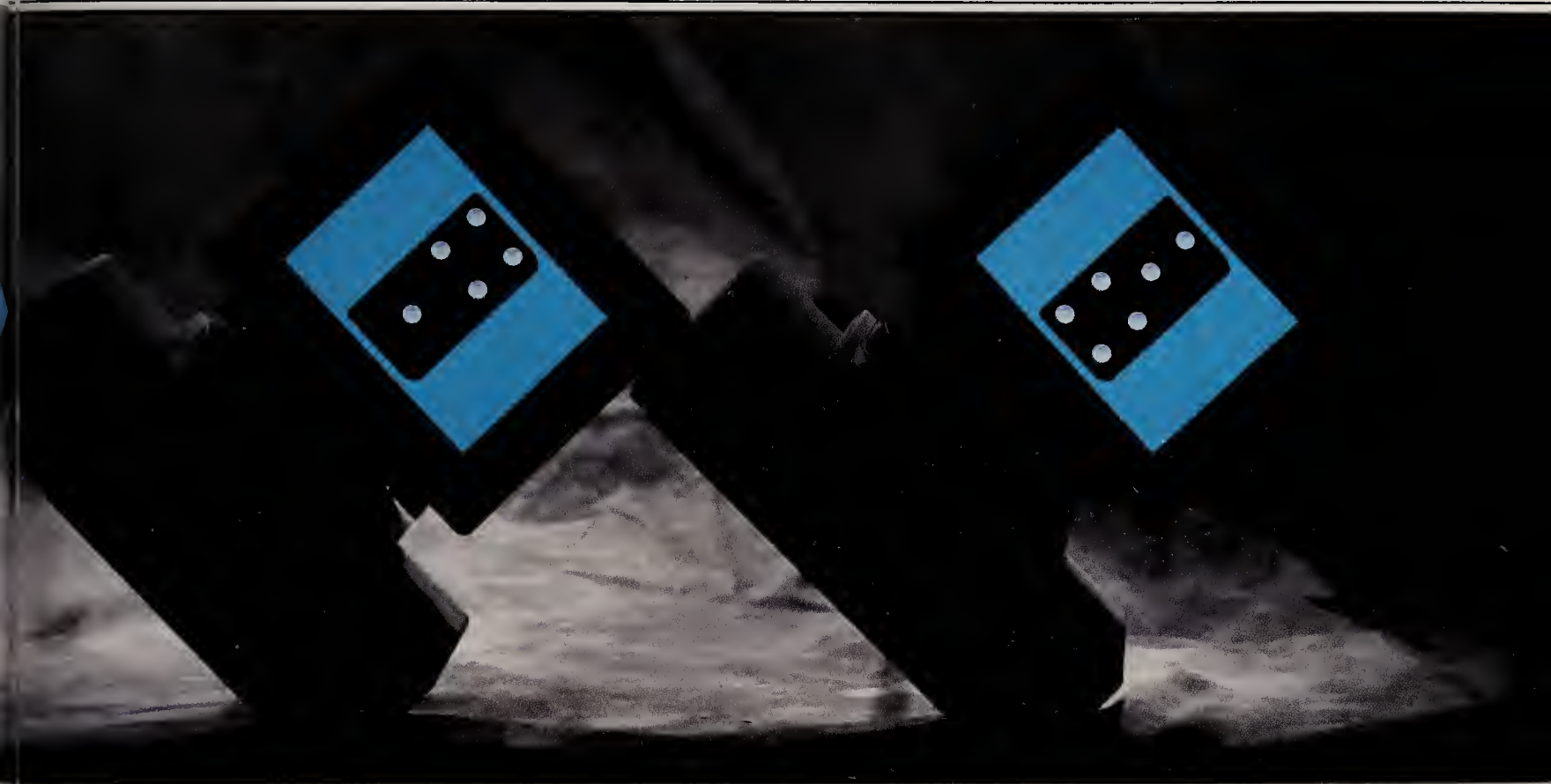
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they can't wait for their suppliers to slowly arrive at the same realization.

Chrysler Corp., in Highland Park, Mich., has made a strategic commitment to just-in-time manufacturing processes (see related story), "and EDI is a requirement to go to just-in-time," said William Sherwood, supervisor of Chrysler's materials-control development systems. Last year, Chrysler directed suppliers of the automaker's 15 assembly plants to engage in select business transactions electronically, on Chrysler's newly overhauled EDI system. (Many of these suppliers were already trading with Chrysler electronically through an older system.) Chrysler set a mid-1989 deadline for the conversion. As

WILLIAM SHERWOOD: At Chrysler, EDI was a necessity for JIT operations.



LANCE DAILEY: EDI has to be "a two-way street."

of early 1990, about 96 percent of Chrysler's 1,600 assembly-group suppliers had complied with the automaker's demands.

Sixty-five suppliers refused to sign on to Chrysler's EDI, however, and as of January first, Chrysler had quickly replaced 39 of the holdouts with more compliant suppliers. "The message is: If you want to do business with Chrysler, you have to do EDI," said Sherwood.

To help suppliers make the move, Chrysler sponsored EDI seminars, recommended 50 "Chrysler approved" EDI software packages, and even set up a third-party system to provide fee-based EDI services for small suppliers reluctant to make the initial \$5,000 to \$10,000 investment required to get moving on EDI. Sherwood noted that both Ford Motor Co. and General Motors are sending similar use-EDI-or-lose-us signals to their suppliers, and that even "transplants" (foreign automakers' U.S.-based assembly plants) are picking up the EDI ball.

Sears Roebuck and Co. is just as adamant that its suppliers adopt EDI technology but has chosen a softer means to coax them. Sears intends to have a full-fledged EDI program in place with all of its suppliers by mid-1992. That means the Chicago-based

retailer wants to communicate electronically the soup-to-nuts of a business transaction—every purchase order, purchase-order change, status inquiry, all inventory information, invoices, and remittance advice. Down the road, said Lance Dailey, EDI project manager for Sears Merchan-

The overwhelming number of companies adopting EDI technology today are doing so only because they have been coerced into it by a few score large customers.

dising Group, "we intend to do other electronic transactions—like funds transfer—or have the vendors tell us their inventory so we can sell against it." EDI isn't just a means of communicating information with vendors, he said; it is also a tool for making business decisions.

Still, this electronic tool's usefulness is limited as long as Sears' suppliers dawdle to implement their end of it. Currently, less than 400 of Sears' 5,000 to 6,000 suppliers use EDI. To push the balance of its suppliers along, Sears recently announced that EDI would become a requirement for doing business (beginning, in stages, in January 1991). But Sears promised to provide suppliers with free software and training—a plan that could cost Sears \$5 million. Moreover, Sears decided not to implement a careful succession of EDI applications (a conservative schedule many companies follow) but to bring up nine applications at once. "We see this as a partnership [with our suppliers]," Dailey explained. "Quite frankly, doing the purchase order electronically doesn't buy me

For a Case of the JIT-ers

Just-in-time manufacturing brings a just-incredible explosion of paperwork; EDI can help save trees while cutting costs

Just-in-time operations are document guzzlers. In traditional manufacturing setups, a company might purchase goods from a supplier once a month—that means there is one purchase order, one ship notice, one receiving report, one invoice and one payment for each supplier every month. If the

just in the assembly group itself," explained William Sherwood, supervisor of materials-control development systems. "Conservatively, it costs Chrysler \$5 a document." The company realized that it would save itself a lot of money by moving the increased tonnage of documents churned up by JIT electronically.

The savings were immediately noticeable. "In our assembly plants, we used to carry five days of material [in inventory]," said Sherwood. "With just-in-time processes, we've worked that down to [having] just 48 hours of inventory on hand." Chrysler's bean counters figure that its EDI-based JIT operations have saved the company over \$1 billion since the procedures were implemented in 1985—and the savings have just begun.

Chrysler hopes to bring other divisions up on EDI during 1990—its components, stamping, power system, and service groups. Meanwhile the company is busily meshing business applications into a single system. "We're trying to integrate the EDI within our corporate systems," Sherwood explained. "Then we figure we'll really get our cost savings."

Down the road, Sherwood predicts that Chrysler will pipe other kinds of documents into its EDI as well—such as CAD/CAM drawings or business graphics. Computer-to-computer links with suppliers will eventually "enable us to function more as partners with suppliers—we will be able to use each others' resources. That will cut down on the product development time for our vehicles, which could be an immense savings to the industry."

—T. Kiely



DOWN TO 48 hours of inventory

manufacturer becomes a just-in-time shop, however, it may require its suppliers to ship material daily, producing a 20-fold increase in the number of transactions. The paperwork increases 20-fold, too.

That is why Chrysler Corp. of Highland Park, Mich., decided that EDI is the linchpin of its JIT strategy. Five years ago, Chrysler tweaked its proprietary EDI system so that each day the automaker could communicate to its suppliers a short-term schedule of shipments. (Last year, Chrysler moved all but a handful of those suppliers to its new system, which is based upon industrywide standards.) But the JIT system Chrysler envisioned would have been prohibitively expensive had it not been done electronically.

"We used to print out on paper 9.8 million material releases a year

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anything. But I know it's important to the trading partner. Where we benefit is when they give us the invoice or the ship notice electronically. EDI is a two-way street."

All good intentions aside, suppliers still don't see it that way. Kent Dyer, data processing manager at Battey Machinery Co., a Rome, Ga.-based distributor of electronic and industrial goods, said bluntly, "We're only doing EDI because it was mandated by customers" such as Georgia Power, Ford, General Motors and AT&T. "But we still prefer the fax machine." Battey, like all too many EDI draft-ees, prints incoming EDI information off a PC and then rekeys the orders manually into the company's order-processing system. While Battey is trying to tie the two systems together, said Dyer, "we're not seeing the benefits to us yet."

And that's the gnat that harasses EDI, according to Jerome Dreyer, president and CEO of The Electronic Data Interchange As-

sociation in Alexandria, Va. "What makes EDI complete?" he asked rhetorically. "It's not systems and standards. It is the totality of the business force [engaged in EDI]." The benefits of the technology accrue to customers and suppliers alike only when a broad number of players use it—and use it seriously. Dreyer includes small businesses among the necessary EDI players. EDI can't be successful if it is confined to big suppliers and big customers; giants are only one population in the business landscape. "The small business is the

missing link," to an effective EDI network, he argued.

To use EDI seriously, companies need to integrate it with other business applications. EDI, as Gartner's Taylor put it, "is just a tool, which, if incorporated into a company's overall technology architecture, can help you improve efficiency." The real benefits of EDI, as the large companies who are pushing this technology have discovered, come when this electronic link to the outside world is merged with a company's internal applications—so that one company's manu-

"The advantages of EDI are real. But if all you want is a tactical solution [to keep big customers happy], that's all you'll get. You'll spend a lot less money, but you'll get a lot less result."

—Dave Taylor

Turning Up the Voltage

General Electric has devised a POS application that sheds light on the brighter promise of EDI



General Electric Co.'s lighting division has forged some unique EDI deals with a few of the nation's large retail chains. When a customer buys a GE light bulb at one of these retail outlets (GE prefers not to name them), the information captured at the point-of-sale terminal is tallied and delivered nightly to the bulb-maker.

"It is economically feasible for us to get fast, accurate daily sales information on what light bulbs we've sold," explained William Cafiero, manager of corporate financial services at GE Information Services in Dallas. "In essence, that allows us to take over the ordering function of the light bulbs. We can make sure that the light bulbs are always on the shelves in the right numbers. The retailer doesn't have to worry about ordering them."

It is also valuable marketing information. GE can now track sales of its products by region, by store, by

neighborhood and also gets its payment immediately.

"Why should the retailer get an invoice from us and write us a check, when we can use that same electronic vehicle to get the payment? In essence every time you buy a light bulb, you can pay us for the light bulb at the same time."

Cafiero said that GE's EDI strategy "revolves around building a strategic relationship with customers. All major companies are going through supplier-reduction programs. We want to be one of the suppliers that's left."

Of GE's 29 major component groups, 28 have active EDI programs in place. "We have a corporate directive, a corporate strategy, a corporate focus to use EDI to make our business run better," Cafiero said. "The idea is to use EDI as a tool to do things differently than we did in the past."

—T. Kiely



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Double Duty

The long transition to full EDI compliance by its trading partners forces Hewlett-Packard to maintain both electronic and paper-based internal systems

It will be years—if ever—before the commercial world abandons paper documents. In the meantime, Hewlett-Packard Co.—like most companies using EDI today—trades paper documents with some customers and suppliers, and electronic documents with others. The Palo Alto, Calif.-based computer firm must also maintain two internal systems for business information.

"It's a headache," conceded Sandy Whitson, Hewlett-Packard's EDI business manager. "It's real tough. We knew we would be in transit [from paper to EDI] for a long time." It has taken more than half a decade for Hewlett-Packard to reach the point where it does 25 percent of its business with its suppliers electronically, and Whitson expects that it will take several more years "to get over that 50 percent line, when you're over the hump" and the momentum to go electronic gets easier.

"We've done some studies on processing savings, where we know the pure cost of generating a hard-copy purchase order and the pure cost of generating an EDI purchase order," she said. "There is a significant savings [using EDI] when comparing apples and apples;" EDI transactions are 50 to 60 percent less expensive. "But I'm not counting in the overhead of managing the EDI program," she continued. "If you take into consideration all the variables, I would say [the two systems] cost pretty much the same."

While EDI does save Hewlett-Packard money on some tasks (such as updating purchase order acknowledgements), all in all "we're lucky if we're at the break-even point in our investment" with EDI systems, estimated Whitson. She calculates that the savings will come as Hewlett-Packard does an increasingly greater percentage of its business electronically—driving down the per transaction cost.

But that depends upon Hewlett-Packard's trading partners. "With new EDI tools coming on the market," Whitson said, "and with EDI becoming more generally accepted, it will be easier for us to get [higher numbers of suppliers] up on EDI."

—T. Kiely

facturing-resource planning system, for example, can be linked to another's scheduling system; or accounts receivable at one company can be linked to accounts payable at another. Moreover, companies like General Electric Co. have found that EDI gives them access to valuable new gulps of information (see related story) and allows them to conduct business in entirely new ways.

EDI is a business solution, and it ought to be sold like one, say several consultants. That might help to lessen the resistance to EDI by trading

partners and make the expanding use of EDI real—not chimerical numbers used to hide the existence of thousands of disgruntled users.

Jeff Brooks, a management consultant based in Louisville, Ky., put it more bluntly. "I don't buy this crap about mandating to suppliers," he said. "Go out there and find out what your trading partners want." Then, he continued, market the benefits of EDI—don't mandate it. "You can pull a string, but you can't push it." (See Brooks's column, "Is EDI DOA?" in the December 1989 CIO.)

Marketing EDI to a trading partner is like "selling any other new product or service," argued Jack Shaw, president of EDI Strategies Inc., an Atlanta-based EDI information company. One must first do one's market research: What is the supplier's attitude toward EDI? What

"If there have been any surprises in EDI to date, [one of them] is that senior management—including chief information officers—has failed to recognize that EDI can be used as a lever to re-engineer the basic business processes of an organization."

—Jack Shaw

benefit do suppliers hope to get out of it? What are their business plans? "They may have business problems that can be solved by information," Shaw said, "but they may not recognize EDI as the potential solution to their problem."

Seminars are one marketing tool. Aluminum Co. of America (Alcoa), in Pittsburgh, is trying to bring all of its key suppliers for its 19 U.S. plants up on EDI. This is an ambitious project, but Alcoa does not intend to hasten the process by mandating EDI to its suppliers. Instead the company has hosted a number of EDI seminars along with Atlanta-based Harbinger EDI Services and Control Data Corp., of Minneapolis. "We had one supplier on EDI in January

1988," said James Jeswald, Alcoa's manager of procurement systems, "and now we have 320. We're very happy with these seminars."

Education, information and hand-holding are key to signing up trading partners, said Harbinger's president, James Davis. "We talk about the Fortune 500; how about the Unfortunate 16,000—or the Unfortunate Millions" who must jump aboard the EDI train. "The challenge of EDI is not only to convince trading partners that they need to do EDI," he added, "but to give them the capability to do it in a fashion that makes good business sense for them."

A good, sensible understanding of EDI's capabilities would further its progress in the market. "EDI is not rocket science," said Laura Andrus, EDI marketing director for Infonet, a value-added network provider in El Segundo, Calif. The technology itself has become the least important issue in the fracas; the computer and communications equipment is old hat, software exists by the gross weight, and standards are jelling nicely. (Others point out that standards are an inconsequential issue in EDI—but lingering standards confusion is used

as an excuse by some to back away from the technology.) "But this is the first application—at least since the telephone or the telegraph—where you are trying to put technology in somewhere other than your own branch offices," said Andrus. "It takes patience, dollars and time."

And it requires commitment on the part of senior management. "If there have been any surprises in EDI to date," said Shaw, "the surprise is that there still has not been sufficient recognition by senior management—including chief information officers—of the strategic value of EDI. Senior management has failed to recognize that EDI can be used as a lever to re-engineer the basic business processes of an organization."

Many EDI watchers insist that global markets, the U.S. government's growing interest in EDI, and good old-fashioned competition may help to transform grudging EDI users into EDI enthusiasts. What also helps is when EDI catches on in other markets.

"What we're finding," said Sunder Kerke, associate professor of manufacturing and operations systems at

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Harbinger EDI Services

Atlanta

IBM Information Network

Armonk, N.Y.

Kleinschmidt Inc.

Deerfield, Ill.

ORDERNET (Division of Sterling Software)

Columbus, Ohio

RAILINC Corp.

Washington

Sears Communications Co.

Schaumburg, Ill.

TranSettlements Inc.

Atlanta

Western Union

Upper Saddle River, N.J.

SOURCE: LINK RESOURCES CORP.



JACK SHAW: Like any other product, EDI must be sold, not dictated.

Carnegie-Mellon University in Pittsburgh, "is that all of a sudden there is interest in EDI, not only from corporations but even [from] federal and state governments, universities and the entertainment industry; the state government for finding your tax records, universities for moving transcripts of students, and the entertainment industry for [selling] tickets . . . around the country."

"For the last 200 years," said Unisys' Costello, "everything we have done [in business systems] is based on the movement of a paper document. We all still love that piece of paper; that's what's got to change. But that doesn't happen overnight." □

Tom Kiely is a freelance writer based in Melrose, Mass.

PHOTO BY CHIPP JAMISON



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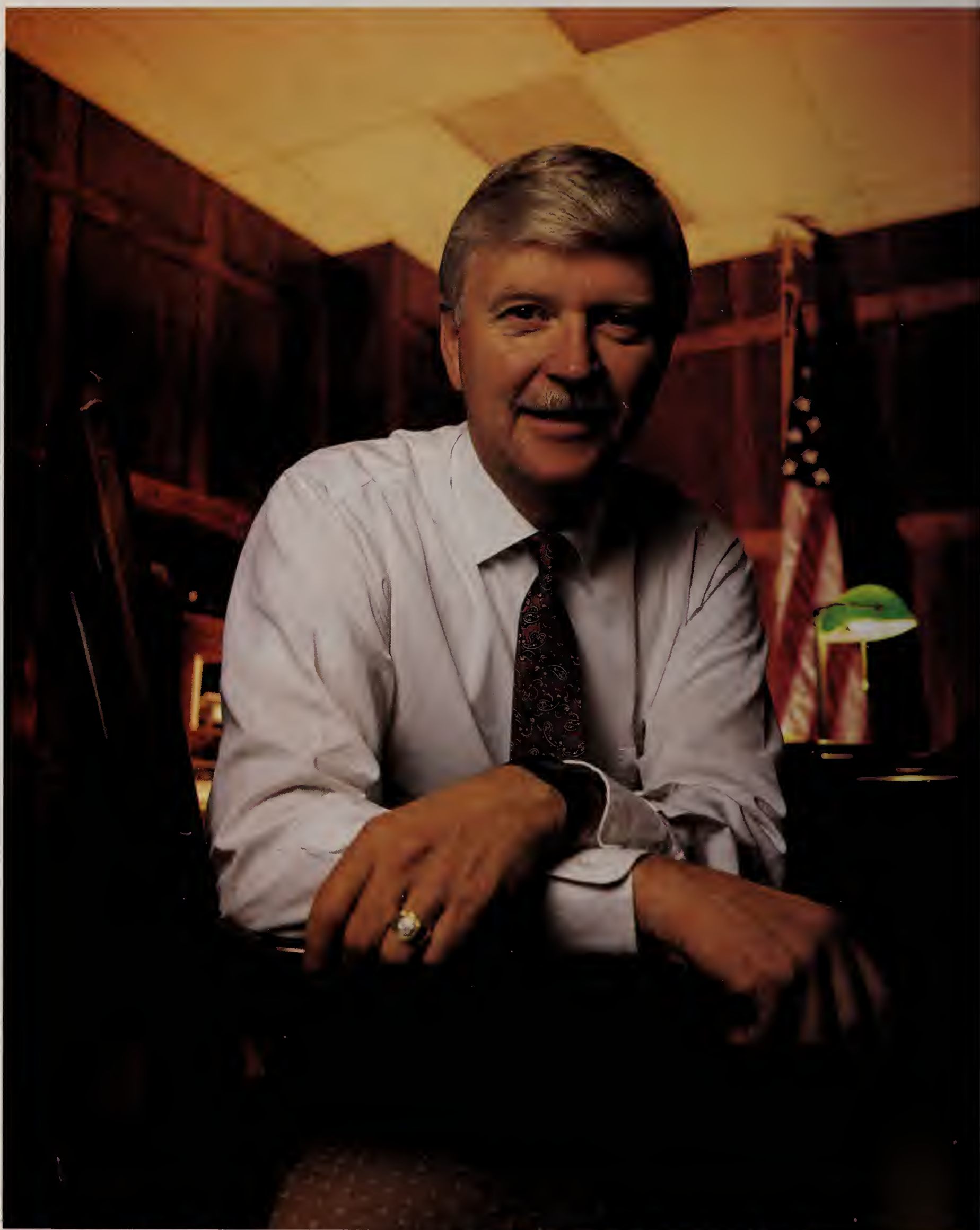




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HENRY PHILCOX: *To bring the IRS's information systems up to speed, he has to "leapfrog the '70s and '80s and end up in the '90s."*

YOUR TAX DOLLARS AT WORK

—

An ambitious \$8 billion top-to-bottom redesign of its information systems could turn the IRS from an IT slug into an IT leader

BY DAVID FREEDMAN



he spacious, handsomely appointed office could at first glance pass for the territory of any high-ranking corporate executive. A large flag lurking in the corner is a giveaway, though; this wood-paneled berth is government property. Right now it's at the disposal of Henry Philcox, who happens to be the CIO at a major federal agency. In fact, only two U.S. agencies—the Veterans Administration and the Internal Revenue Service—have even established the position of CIO. Philcox is with the less popular one.

It isn't just his title and furniture that resemble those of his commercial-sector counterparts. Philcox has a task to match: upgrading, making more flexible, and integrating a slew of incompatible systems, and then applying the results to the organization's strategic goals. Sound familiar? Of course it does. Philcox is trying to do what practically every CIO in the world is trying to do. It's just that the IRS's information load is, well, BIGGER,

PHOTO BY MANUELLO PAGANELLI

A few of the largest banks or insurance companies have systems that approach the size of a piece of ours. . . . What we're undertaking here is on a par with the space-shuttle program."

—Henry Philcox

than those of other organizations.

A lot bigger. Each year some 200 million tax returns and one billion tax-related records pour into the IRS's 63 district offices (each supporting as many as 20 or more sub-district offices), seven regional offices and 10 service centers. Every letter and number on every record is subject to processing, collation, verification, auditing, modification, storage and retrieval for reexamination. "A few of the largest banks or insurance companies have systems that approach the size of a particular piece of ours," said Philcox, "but no one approaches the whole thing. What we're undertaking here is on a par with the space-shuttle program."

It's not a comparison that everyone would care to make these days, given the uneven fortunes of the space shuttle, but the point is well taken. The sheer size and complexity of the task brings the IRS into unknown territory, where both the risks and potential payoffs are tremendous. And as if the challenge of imbuing this information behemoth with leading-edge technology weren't ambitious enough, the IRS is starting from a decided disadvantage. "We're still running the same batch systems that were brought in in the early 1960s when we were getting 4 million returns a year," said Philcox. "Now we want to leapfrog the '70s and '80s and end up in the '90s." And he wants to make the transition smooth, to boot.

How does he plan to accomplish all this? With a lot of money, for starters. The government has budgeted \$6 billion for new hardware, software and integration services, plus another \$1 billion to \$2 billion to maintain the existing systems while the transition is made. The IRS started its efforts two years ago and expects to complete them in another eight. If it is successful, the results will be impressive indeed: From a hodgepodge of cranky and uncommunicative systems that rely heavily on warehouses full of paper, the IRS will have built a solid information structure in which virtually any employee can quickly call up onto a screen virtually any piece

of information that the IRS has in its possession, including images of original tax returns.

Predictably, there is no shortage of skeptics. After all, who doesn't like to cast aspersions on the IRS's competence in even mundane matters, let alone one of the most ambitious information technology projects ever? Besides, it was only four years ago that the IRS took a well-publicized vacation to data-processing hell when it botched a systems upgrade job that left taxpayers waiting six months and more for refunds. And that task was nothing compared to what it has set out to accomplish this time around.

Philcox quickly concedes that the upgrade nightmare was a first-rate screw-up on the IRS's part. The disaster, he said, stemmed from the decision to convert its sea of ancient assembler code to COBOL at the same time that it was replacing its mainframes. The new code turned out to be buggier and more power-hungry than expected (of course), but the agency couldn't fall back on its proven assembler code because it had al-

Mastering Complexity

When it takes 42 questions just to determine if a taxpayer is the head of household, it's no wonder the IRS is tapping the power of expert systems

ready replaced the old mainframes, and the new ones wouldn't run the old code. Philcox learned his lesson; the upcoming conversions will all be handled piece by piece, with old systems remaining in place until their replacements have been fully checked out. "We wouldn't consider running anything new without a fall-back system running in parallel," he said. "It's more expensive in the short run, but it's a lot cheaper in the long run."

Even introduced gradually, the envisioned IRS systems redesign involves a staggering leap in technology. Appreciating the scope of the undertaking requires understanding how the process functions now.

When a taxpayer files a return, the document is mailed to one of the IRS's 10 service centers. After the form is manually reviewed for obvious problems (such as a lack of a signature), about 40 percent of the information on the return is keyed into a local database, and the return itself is shipped to a warehouse. Then the service centers physically ship the



tapes containing the keyed return data to the IRS's national computing center in Martinsburg, W.Va., where the data is collated in a

central batch database and tax refunds are processed. Only about 3 percent of taxpayer data is actually kept online, in specialized online databases that are scattered around the country.

The fun really begins when the IRS tries to deal with the huge number of returns that don't sail smoothly through the process. These include returns with errors or missing information (for instance, unreported income), those that contain an underpayment of taxes due or that are accompanied by taxpayer queries, and, last but not least, returns se-

IRS STAFF processing paper documents may be able to handle tax returns electronically.



lected for auditing. In any of these situations, the return is assigned to a caseworker based in a district or sub-district office.

In such instances, the caseworker obviously needs access to information on the particular taxpayer's return and, in most cases, to his or her tax history; unfortunately, by this point that data is scattered across a variety of databases and paper documents. Sometimes the caseworker can obtain needed information by tying into the appropriate online databases, one at a time, via a local terminal or PC (and even then, lag times in updating can result in inconsistent data). But since only 3 percent of IRS tax-return data is available online, it is far more often necessary to put in a request to receive a report from the computing center or to have paper documents such as the return itself retrieved from storage to be copied and shipped to the local office. Either process can take six weeks or more. "Meanwhile," noted Philcox, "the caseworker has to put the taxpayer on hold. That's a burden on the public."

Of course, the public doesn't have

Artificial intelligence is slated to play a supporting role in the systems plans of the Internal Revenue Service. A prototype AI-based system has already been running in the Boston area since last year to help IRS workers answer taxpayers' questions. The system, which runs on a workstation, prompts the worker to ask a series of questions of the taxpayer relating to the topic at hand; which questions are asked depends on the answers given to the previous questions. As the system processes the answers, it consults a series of "rules" and attempts to settle the confusion—which can be considerable, given the fact that it takes as many as 42 questions to determine whether or not a taxpayer qualifies as a "head of household."

"The results have been phenom-

enal," said CIO Henry Philcox. "We're sure it's a solution to quality problems in taxpayer services." This year the IRS will extend the system to five other district offices.

The agency has established an AI lab to design other applications and is currently planning to incorporate at least five AI-based systems into its architecture over the next eight years. One of these will be a tax-return classification system, which will take over the subtle job of determining which returns should be set aside as audit candidates. "We're trying to capture the expertise of our most experienced auditors," Philcox explained. With the complexity of the U.S. taxation process, artificial intelligence could prove to be the agency's—and taxpayers'—salvation.

—D. Freedman

PHOTOS COURTESY INTERNAL REVENUE SERVICE

A team of more than 50 computer scientists recently finished designing a master architecture, complete with a detailed database model that covers all of the data available to the IRS.

much choice. But Philcox prefers to think of taxpayers the way companies think of customers. And by that standard, Philcox considers the IRS's current capabilities unacceptable. "People are used to dealing with financial institutions that can retrieve information immediately, and they expect the same from us. We want to provide the same sort of response that they get from American Express." If the IRS's plans are implemented on schedule, that's exactly what taxpayers can expect by 1998.

The basic game plan for the massive project is to get as much data as possible online into integrated databases, and then to make the rest of the data available through a document imaging system. "We want to extend our systems out into the workplace so our caseworkers aren't dealing with paper printouts and documents," said Philcox. "We're taking a look at the way we do business and examining all the ways that incorporating modern technology can improve it."

That process has already begun. One modest but high-payoff example: For the first time, IRS field workers can now access a database of the names and addresses of all the people in their areas. In the past, these workers received a report from the computing center listing all the tax return names that didn't jibe with the central records. The field workers then had to telephone the people to straighten things out. Last year some 5.6 million such phone calls were made. Now the workers can make the appropriate comparisons and changes online in seconds before the data gets to the computing center, eliminating most of the calls. "That represents millions of dollars in savings to us," gloated Philcox, "not to mention reducing the burden to taxpayers of having to be contacted."

Also up and running as a prototype in the Northeast is a system that integrates two previously disharmonious databases needed to chase after overdue tax payments. One of the databases provides workers with a list of those people who owe the IRS money; the other provides more cur-

rent and detailed information on the taxpayers in the area. Workers often needed to access both to avoid wasting time on the phone with incomplete or out-of-date information, but that required logging onto each system separately through different terminals.

Now the new system, built by a subsidiary of Cincinnati Bell, allows tying into the two systems simultaneously through a single terminal and toggling back and forth as needed.

The real transformation still lies ahead. A team of more than 50 com-

TECHNICAL PROFILE

The Internal Revenue Service is the United States government agency responsible for collecting tax revenues. The agency employs about 120,000 people and processes some 200 million tax returns each year. Between 1988 and 1998, the IRS plans to spend an average of \$600 million a year to upgrade its systems and \$150 million a year to maintain existing systems.

Hardware: Most of the IRS's processing currently takes place at the agency's computing center in Martinsburg, W.Va., and at the 10 service centers across the country. Among the 96 mainframes operating at these facilities are IBM 3090s and 3084s, AMDahl 5880s, NAS 9080s and 9060s, and Unisys 1190s and 1184s. In addition, uncounted minicomputers (a growing percentage of which are Unix-based) and PCs (most of which are MS-DOS-based) from a range of vendors operate at these sites and at the 63 district offices around the country.

Software: Although the IRS employs a large number of off-the-shelf software packages, the brunt of the processing chores are handled by the 8 million to 12 million lines of assembler code and 10 million lines of COBOL code that have been written for the job over the past 30 years. Most of this code has been designed for a batch processing environment, and converting the systems to online operation will take up much of the systems upgrade effort now underway.

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A One-Item Agenda

The head of the IRS has only one thing on his mind these days—keeping the agency's resystemization effort on track

IRS Commissioner Fred Goldberg has a lot in common with many of his CEO counterparts in the commercial sector—he has taken on an active interest in the strategic use of information technology. "Without question," he said, "the most significant item on the long-term agenda of this agency is to modernize our systems. It is an agenda with one item; it is the key to the future of tax collection in this country."



FRED GOLDBERG: executive backer

That's the kind of statement that would warm the hearts of even the most attention-hungry CIOs. And Goldberg insists that his commitment goes well beyond words, claiming that he spends about a third of his time on IT-related matters. "I wouldn't know a MIP if it sat on me," he said, "but I view my job as trying to help set priorities and make broad-based decisions about systems. I also spend a lot of time trying to articulate our vision

to the administration, Congress and the public."

Goldberg knows it's a vision that will be exceedingly difficult to implement, but he insists that the IRS is going about it the right way.

"I'd be uncomfortable if we were planning to be ahead of everyone else in terms of the technology we're using," he said. "The government is risk-averse, and that's the way it should be. There's no upside to risk; we have to do things right. . . .

"We're making a point of using proven technologies," Goldberg continued, "except that the scale will be larger—and that's more of a managerial problem than a technical one. The image processing is the trickiest part, and we're only going to swallow that piece by piece as it becomes available. Even if that part never happens, a goal of getting 20 million returns filed electronically will be enough to drive this entire project."

Creating the position of CIO for the agency has made a big difference, Goldberg contends. "Giving someone authority and accountability over the entire landscape materially enhances the likelihood that we'll succeed," he said. "That's what works for the private sector, and we're no different."

He dismisses the notion that the project could be a total failure. "At the worst, we'd just waste a lot of money," he said. "The question is, how much better can we do? I'll measure our success eight years from now when [the project has been completed and, as] an ordinary citizen, I call the IRS to take care of a problem." —D. Freedman

puter scientists, half from the IRS and half from The MITRE Corp., an independent not-for-profit systems engineering firm in Bedford, Mass., recently finished designing a master architecture, complete with a detailed database model that covers all of the data available to the IRS. The architecture will unify all IRS systems, assuring nationwide connectivity and fast, smooth data access. Some existing systems will be incorporated into the new architecture, but most of the pieces will be built from the ground up using state-of-the-art software design techniques and open-systems standards throughout. The new software will be matched with a brand-new fleet of mainframes and minicomputers capable of powering the highly complex systems. "We've looked at the architectures of various financial organizations, and we've gotten a good sense of which new technologies might meet our needs," said Philcox. "We're satisfied that the architecture we've ended up with will accomplish what we want."

The decision to include document imaging—which will allow pulling up pictures of tax returns and other documents on caseworkers' screens—as an integral part of the architecture is probably the boldest element of the plan. Imaging is still largely unproven on a large scale, and the IRS's needs will stretch the technology to its limits. But Philcox insists his group has done the research appropriate to moving ahead with the scheme, which he said will go online between 1995 and 1996.

He noted, for example, that a prototype system built five years ago was capable of capturing images of 90,000 documents per day with a successful capture rate of 98.7 percent. The system will require some 17 terabytes of data storage (seven times as much as will be required by all the non-image data), but he claims that currently available 850-gigabyte optical disk carousels will be able to provide that much storage without a problem. "It will be a huge system that requires special tailoring," he conceded. "But we believe it will be

PHOTO COURTESY INTERNAL REVENUE SERVICE

"We'll get a complete return on investment within three to five years. And that's just internal cost savings. If we can hone our non-compliance operations . . . , we'll save the economy a lot of the money spent for . . . accountants and other professionals."

—Henry Philcox

an integral part of the system. Right now we're spending \$40 million a year to store and retrieve documents, including clerical, transportation and mail costs. That will buy a lot of image."

All this sounds wonderful, but then again, \$8 billion is a lot of money. Are the IRS's grand schemes worth the costs? Philcox insists that's an easy question to answer: "We'll get a complete return on investment within three to five years," he said. "And that's just our internal cost savings. If we can hone our non-compliance operations so that we're not examining the returns of fully compliant taxpayers, then we'll save the economy a lot of the money spent for assistance from accountants and other professionals."

One thing the new systems probably won't do is to help reel in more tax cheats. The IRS already does as much auditing as is likely to pay off, and going further would require a change in laws, not in information technology. The new systems, however, will enable the IRS to get the same money out of the same non-compliers faster and at lower cost—and will get paid-up-in-full citizens off the hook more quickly, too. "Right now we typically take two years to contact a taxpayer about an audit," said Philcox. "It's possible we can reduce that to a few months."

Right now the IRS is in the time-consuming and highly bureaucratic procurement stage, which involves soliciting and reviewing bids from the multitude of vendors that want a piece of the action. It is currently about to award the biggest chunk of the pie so far—about \$1 billion—for a contract for minicomputers and local-area networks. Smaller contracts for PCs, mainframes and applications design have already been awarded. Each of these decisions has been "protested," a formal process by which a losing vendor demands that the decision be reviewed. "Everything we do in this project is going to be protested because of its size, and because it doesn't cost the vendor anything," Philcox sighed.

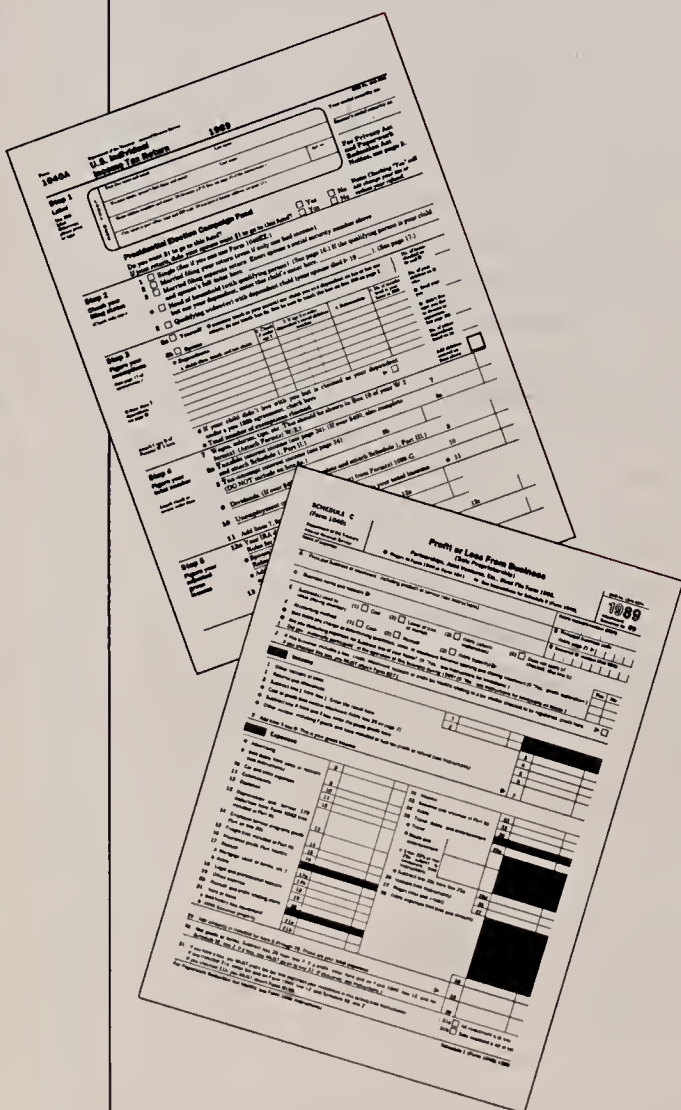
Despite these political burdens that

are the trappings of life in Washington, Philcox has tried, to the greatest extent possible, to employ private-sector-style information-technology approaches. Instead of following the traditional top-down management style of government agencies, for example, he has pulled users into the systems development process wherever possible. "Users have to be a big part of the effort," he said. "We've had caseworkers and their managers reviewing functional specifications and participating in prototyping work." One of the first new systems to emerge from the process is one that automates the comparison of tax information from banks and employers with tax returns; it will come online this year.

The IRS has even brought "customers" (tax professionals) and "suppliers" (employers, banks, and state and local tax agencies) in on the project. The agency has sponsored two forums where representatives from these various parties meet with IRS information technology managers to discuss ways in which they link their own systems to those of the IRS. The IRS is also working with standards committees to develop a tax-information reporting format that will allow tax professionals and institutions and companies to ship off all their tax information electronically to all the relevant tax agencies in one fell swoop. "Right now," said Philcox, "a lot of information goes from paper to computer, back to paper, and then back to computer again."

For all his efforts, Philcox refuses to paint an unrealistically upbeat picture of the task ahead and its guarantees of success. "I'm very reserved about where we're going," he said. "Washington can be a difficult place. But if we get the right vendor support, . . . overcome the procurement process problems and . . . find the right people ourselves to manage the contractors—and that's a lot of 'ifs'—then I think we can do it." It's almost enough to make you want to root for the IRS. 

David Freedman is a freelance writer based in Brookline, Mass.



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The association between IS executives and top management does not have to resemble the relationship between Felix and Oscar of "The Odd Couple." With a common goal, a little understanding, and a lot of mutual respect, the pairing can result in dynamic teamwork.

STRATEGIC PAIRINGS

SIM bestows its 1990 Partners in Leadership awards on the City of Dallas and Bergen Brunswig Corp. They both have formed rare and successful alliances between the head of IS and the head of the organization

BY
MEGAN
SANTOSUS

For the past three years, the Society for Information Management (SIM), a professional society of IS executives based in Chicago, has bestowed its Partners in Leadership award upon two sets of senior IS executives and management executives who have teamed up to successfully "integrate information technology with business strategy to achieve corporate goals." This year's winners—the City of Dallas and Bergen Brunswig Corp.—were presented with their awards last month in New York during SIM's annual meeting.

In the 1980s, the Dallas Police Department was no different from the police forces of many other American cities. With a rising crime rate and a municipal budget edging toward the red, police officials in Dallas were faced with the dilemma of handling an increasing workload with the existing work force. The department had to find a way to improve the efficiency of every officer without comprising performance.

The proposed solution involved a dual integration approach: consolidat-

ing the hodgepodge of police systems—phone, computerized dispatch, radio and squad car terminals—into a single, fully integrated system, which would then be linked with the city's central mainframe.

Heading up this ambitious project was Leslie Sweet, the assistant chief of police, and David Morgan, the director of information services for the City of Dallas. Sweet was actively involved during the entire course of the project, from applications development to testing to training the officers on the new system. Morgan concentrated on designing the protocols that would link the police systems. "The big test," said Morgan, "was bringing 911 and mobile data terminals together."

The \$3 million project, which has been up and running since April 1988, was completed on time and under budget, and the city realized savings immediately. An original \$10 million plan to upgrade the radio system was ditched, along with its requirement to hire an additional 12 dispatchers. The system, said Morgan, "pays for itself over and over again in terms of the productivity of the officers."

For example, when someone dials 911 in Dallas, their address and phone number appear on the dispatcher's terminal. The dispatcher types in the specifics—such as the nature of the call—and electronically dispatches the message to the nearest patrol car via the mobile data terminal located in every vehicle. (Calls are still sent by radio as well.) Not only is response time reduced—by one minute per call on average—but so is the occurrence of costly transcription errors, because the crucial information is no longer written down. According to Morgan, it now takes only two people to dispatch a car, compared to the six it used to require. And the responding officers can even talk to the distressed caller directly via their cellular mobile phones.

This enhanced automatic-number-identification feature not only helps in cases where the caller cannot communicate, but it also enables police to

SIM
International

detect and deter false calls. "If someone reports a bomb threat at the airport and he's really calling from a public phone downtown," said Morgan, "police won't bother to respond." Or suppose a kid calls from his home, reports a fire and hangs up. "Now we know his number," said Sweet, "and I'll bet he'll be pretty surprised when we can call his mother." Consequently, the number of false-call responses has decreased significantly.

Officers can now dial into federal and state criminal databases directly from their patrol cars with a response time of five seconds compared to the 10 minutes it used to take. Vehicle identifications can also be accomplished in about five seconds, enabling the volume of IDs to double to 16,000 per month. Officers can file relatively simple incident reports from the field by either typing them on their on-board terminals or dictating them over the phone. Identical information often needed for several different reports is easily transferred to standardized forms. And the reports can then be routed to the desktop terminals of the people who will be working on a given case. "There's no more paper," Sweet said, "except of course what the computer churns out."

Police can also access the databases of other city departments, which are all linked to a single mainframe. Such a capability is especially important during raids on crack houses, Morgan said, because police "can tap into tax records and find out who owns the place and who's supposed to be there."

"The more information we have," Sweet added, "the better we can do our job."

Morgan and Sweet have collaborated on a number of smaller projects since 1982, and their most ambitious project—integrating 911 with the mobile terminals—has only reinforced their mutual respect. "I've developed a new understanding of line managers and their business," Morgan said. "I let the police be the judge of what [system] works best for them, and then I try to implement it."



LESLIE SWEET (left) and DAVID MORGAN: *a history of collaboration*

Sweet places credit for the success of the IT implementation entirely on Morgan's shoulders. "He always takes the extra step to make sure that keystrokes and workload are kept to a minimum." As a result, the technology was enthusiastically received by all members of the department. So much so, said Sweet, that "it would be impossible for the Dallas Police Department to provide the [same level of] services without computers and automation."

Currently, the department is looking into implementing an imaging system that would enable photographs and fingerprints to be sent directly to police in their patrol cars.

The other co-recipients of the Partnership award might also hold the record for the longest CIO-CEO alliance. Bergen Brunswig's Senior Vice President of Corporate Information Resources Anthony A. Vallario and Chairman and former

PHOTO BY PETE LACKER

CEO Emil P. Martini Jr. have worked together for over 35 years (see "A Singular Reign," *CIO*, September 1990). During Vallario's and Martini's tenures, the Orange, Calif.-based Bergen Brunswig grew from a small family-run company to the nation's second-largest wholesale pharmaceutical distributor. (Bergen Brunswig is also the largest distributor of home videotapes.) With average annual sales close to \$2 million per employee, Bergen Brunswig's operating costs are among the lowest in the industry—in part, a result of its EDI systems. In a business where all the competitors sell identical products, the key to Bergen Brunswig's success has been keeping costs low while providing superior customer service. "We wouldn't be where we are today without information technology," said Martini.

Since 1971, Vallario has been pioneering the use of EDI to automate every step of the order-entry process. The first rudimentary system used punch cards and telecommunications to link Bergen Brunswig with its largest supplier. Today, 94 percent of Bergen Brunswig's supplies are ordered electronically.

In 1974, the company introduced the first of its customer order-entry systems known as PHASE (pharmacy automated system entry), which enabled orders to be keyed into a hand-held terminal and sent via telephone to the company's mainframe. This first PHASE system has been continually enhanced and upgraded and is the base of all the company's current customer systems.

Today a POS system links all 10,000 customers to one of Bergen Brunswig's 32 divisions. This electronic link provides customers with up-to-the-minute pricing, availability and quantity information. Once orders are keyed in, they are filled at one of Bergen Brunswig's automated warehouses, which can process 1,800 orders an hour without human intervention. According to Vallario, the next goal is to link every customer to an automatic replenishment system, eliminating the need to punch in orders. "We're always looking for ways to serve the customer," he said.



EMIL MARTINI JR. (left) and ANTHONY VALLARIO: shared enthusiasm

Since installing the industry's first computerized inventory-management and accounting system in 1959, Vallario has been at the forefront of the IT revolution. Being a leader required a lot of trust on Martini's part because there were often no guarantees that a system or technology would work. "I was always impressed with Tony's loyalty," Martini said. "He always cared about the company and the customers. [He] was very good at innovating, and I always knew that he would find a way to make things work."

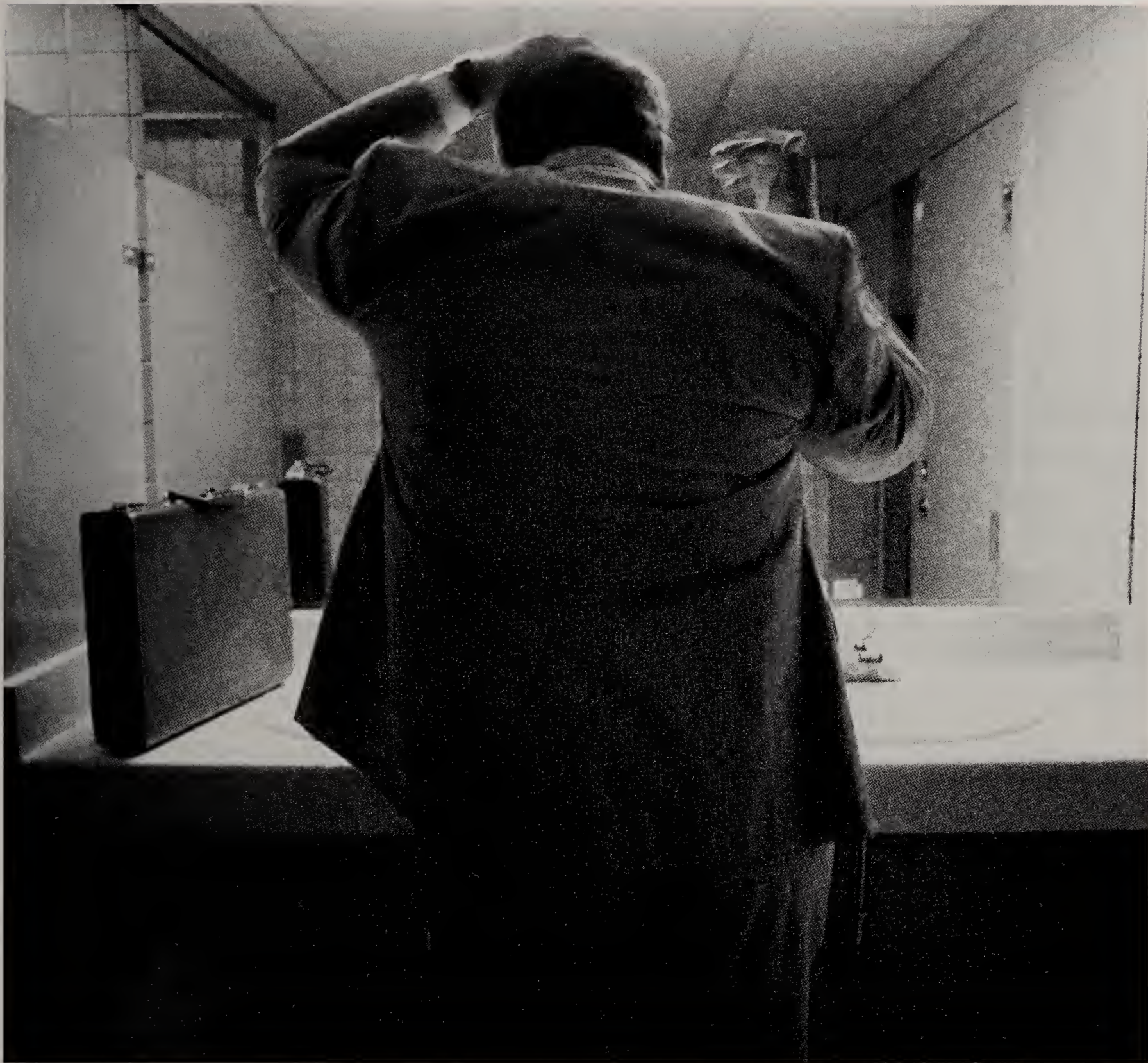
Martini took an active interest in learning about technology firsthand. He and Vallario occasionally took IBM seminars together, and Vallario appreciated the fact that they shared the same enthusiasm. "It was nice to know that the boss knew what you were talking about," Vallario said.

Vallario also knew what was expected of him from the very beginning. "Being the strategist, [Martini] knew what the goals were, and we in

IT always knew what we had to march to." He believes that many of his own achievements are due to Martini's active role in promoting the use and acceptance of technology among employees and customers alike. "He is the Lee Iacocca of the pharmaceutical industry," Vallario said.

Over the years, the most valuable lesson Martini has learned is one he offers as simple advice to any burgeoning CIO-CEO partnerships. "If you've got a good IT man," he said, "listen to him."

The 1990 Partners in Leadership winners are not one-hit wonders. While both Dallas and Bergen Brunswig may have their crowning IS achievements, their overall success is based on the longstanding relationship and mutual drive for continuous improvement shared by all four of the winners. Never content with simply getting their systems online, both sets of partners saw IT as a means of achieving organizational excellence. 



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A Circle of Friends

Another kind of networking—
assembling a group of
savvy peers—can help
CIOs draw upon
collective wisdom and
gain fresh insights

BY G. WARD KEEVER

When the word “networking” is mentioned to a CIO, it frequently conjures up visions of fiber-optic wire, file servers, microwave and satellite transmissions, Ethernet versus token-ring technology, and various types of communications standards. In fact, the CIO position has often been described in terms of networking the various types of hardware and software that currently exist today throughout most corporations—a role whose initials might more appropriately stand for “Chief Integration Officer.”

There is, however, another type of networking that is also critical to CIOs: the establishment of peer groups comprising people in similar organizations throughout the country. Such groups are important

sources of new ideas, validation of strategies, and lessons learned. In fact, peer networking might be considered every bit as important to a CIO's success as the challenge and expectation to integrate various technical platforms within a common telecommunications network.

Four years ago, I left the chemical/pharmaceutical industry and joined the health-care industry as CIO of one of the larger not-for-profit health-care systems in the country. Although I was confident of my management skills and technical knowledge, it was quickly apparent that I needed to gain a thorough understanding of the business issues, clinical opportunities, software vendors, critical success factors and other circumstances that are unique to health care. Furthermore, I needed to gain this education as quickly as possible in order to fulfill my assigned role and be an accepted member of the executive management team.

Another challenge was to invest wisely the millions of dollars that would be required over the next few years in a technology strategy that minimized technical obsolescence and maximized flexibility and integration of applications within a common architecture. (That's a roundabout way of saying that I needed to understand and decide which technologies and vendors to pursue from among the many confusing choices.) Researching, evaluating and understanding future technology directions is a large task—one for which a CIO does not have sufficient time, especially if he or she is also to provide the leadership to the information services staff and present his or her credentials as a person who understands business issues as well as technology.

To help myself better understand the health-care issues and the various software and hardware vendors,



technology options and trends, I initiated two separate peer networking groups.

In partnership with another health-care CIO, I created the first group during the winter of 1986/1987. It is a group of CIOs from the larger not-for-profit health-care systems throughout the country. We call ourselves Health Care Information Systems Executive Association (HISEA). Membership is limited to 30 people. We adopted a formal set of bylaws that requires each member to be an active participant or else be dropped from membership. Participation includes attendance at an annual three-day meeting for the purpose of exchanging ideas and solutions to common problems; participation in an annual survey that describes each organization's staffing, business operating statistics, components of the IS operating budget, the technical environment, and recent accomplishments; and participation in mini-surveys that can be initiated by any member at any time on any subject. Recent surveys included:

- Disaster-recovery options;
- Evaluation of physician office-management systems (to install in physicians' offices and connect to hospital-based information and systems);
- A comparison of expenses per occupied bed to determine whether a particular hospital's IS costs were in line with other similar organizations;
- Understanding the key contracting elements and experience of others in preparation for negotiation with a specific vendor.

HISEA is now entering its fourth year of existence. Whenever a member no longer qualifies for membership, either through promotion or career change, new members are selected from a growing backlog of applications. Membership is always kept to 30 in order to maintain the camaraderie of the group. There are no annual dues or initiation fees; however, each member does share in funding the cost of the annual meeting. Perhaps the most important observation that I could offer regarding the success of this group is to simply say that its members have all become good friends with a genuine desire to

help each other succeed in each member's respective job.

The second peer networking group, organized in 1988, consists of 40 CIOs in health care. Its purpose is to help maintain each member's awareness of the many technology trends, options and vendors. Thus, in addition to 40 CIOs, we selected a consulting company—Gartner Re-

To help myself better understand the health-care issues and the various software and hardware vendors, technology options and trends, I initiated two separate peer networking groups.

search (an IT research firm in Stamford, Conn.)—as a partner that can advise and consult in the various technology issues that we all must continually address. Each member provides a modest financial retainer to Gartner in return for a weekly subscription service that provides various technology updates, telephone consultation with any of Gartner's research personnel, and an annual two-day meeting of the members hosted by Gartner. At this meeting, the various technology scenarios are summarized and presented along with the results of Gartner research into three specific topics selected by an annual vote of the members.

Consulting services with Gartner personnel and among members of the group are useful for such topics as:

- Determining residual value of computers when selling or buying;
- Deciding whether to upgrade from MS-DOS to OS/2;
- Understanding the difference among the various local area net-

working vendors in both current technology and future direction;

■ Anticipating announcements of new families of computers from IBM, DEC or other vendors.

Taken together, these peer networking organizations respond to critical issues facing each CIO within health care. Participation in these groups helps to minimize the risk of "reinventing the wheel," wasting time, moving into approaches or systems that have already failed in other installations or, more important, understanding what solutions or vendor-supplied systems have already been successfully implemented.

Yet another CIO peer network is the Society for Information Management (SIM). Headquartered in Chicago, it has local chapters in every major city in this country as well as several international chapters. Local SIM chapters generally meet for lunch or dinner sessions, at which excellent speakers discuss various topics and ideas that are not industry-specific. These topics include using IS to help achieve competitive advantage, providing leadership and direction to the IS staff, and implementing executive information systems. SIM also hosts an annual meeting covering topics of current interest to CIOs. Of equal value is the opportunity given to SIM members to participate in a peer network to discuss and pursue issues of common interest.

It is becoming increasingly imperative that the CIO perform as chief architect of the information-services asset. He or she must also help to guide the investment of limited financial resources in a way that maximizes response to corporate strategy, minimizes potential obsolescence, and at the end of the day fits all of the technology together. I am not smart enough or lucky enough to attain that goal all by myself. I need the help of others based upon their experiences, knowledge and wisdom. Peer networking is an easy and rewarding solution with significant practical paybacks. Perhaps it is an idea that will help you. ☐

G. Ward Keever is vice president of information services and CIO at The Medical Center of Delaware.

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Desktop Spectaculars

There's more to information than plain old text. Multimedia computing can blend in sound and imagery, adding spice and illumination

BY SCOTT WALLACE

Multimedia computing is a mixture of text, data, graphics, animation, photography, video and sound delivered as a single desktop presentation. This recipe is designed to entice, engage and inform (though, in general, multimedia presentations get better reviews for their entertainment value than for their informational content). However, some companies, including McCormick & Co. Inc., the \$1.25 billion vendor of seasonings, flavorings and other food specialties, have added steak to multimedia's sizzle and found a place for it on the top shelves of their MIS cabinets.

One study of the size of the multimedia market, conducted by the S. Klein Library on Computer Graphics in Sudbury, Mass., has forecast 1990 sales of \$3.7 billion, growing to \$13.6 billion in 1994 (see chart). The Klein study took a broad view of multimedia, defining it as any microprocessor combination of graphics and audio or

video. Klein looked at 370 vertical markets, including business, consumer and embedded-processor applications (such as the talking automobile chips that tell you your fuel tank is almost empty or your door is ajar).

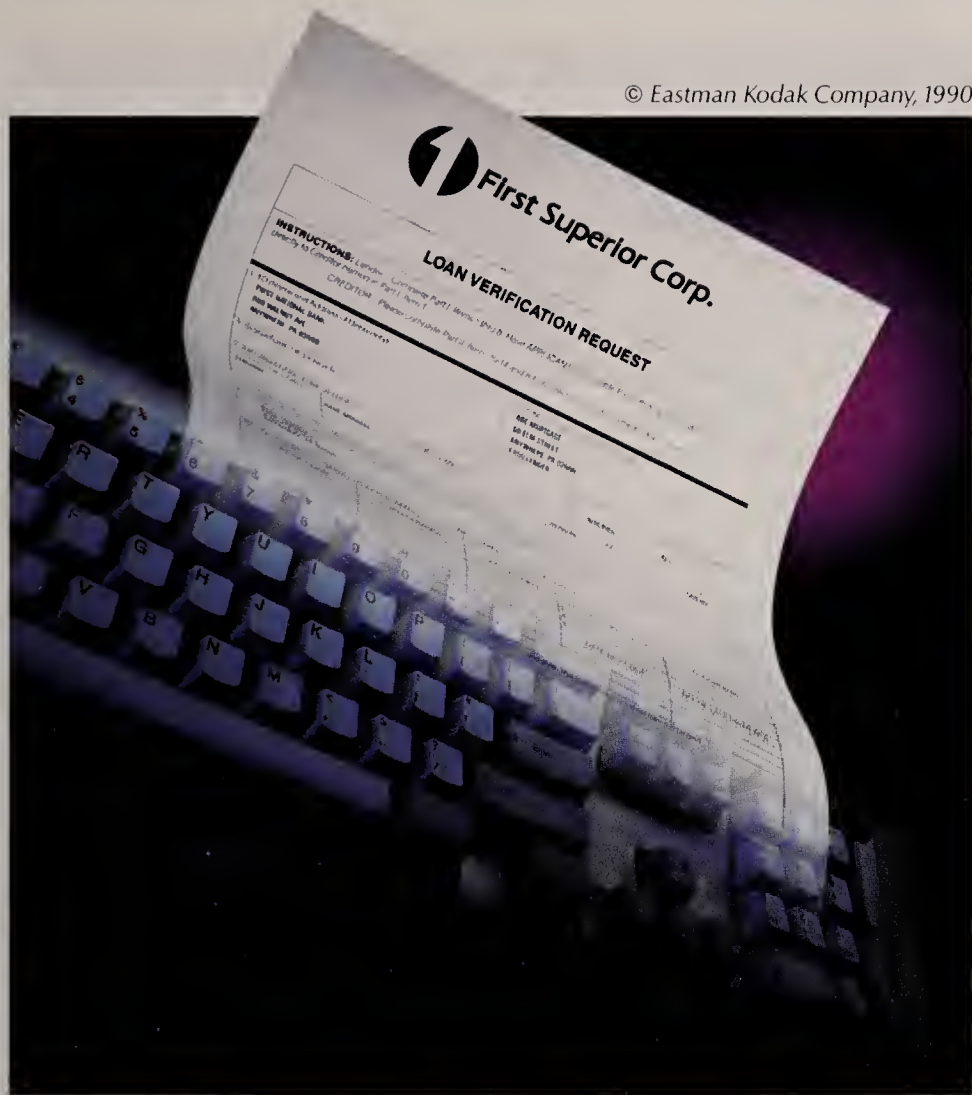
Apple Computer Inc., leveraging the strength of its graphical interface, has done more to bootstrap multimedia than any other major manufacturer, although not as strongly in corporate environments as in education. IBM Corp., which uses multimedia extensively for in-house training, is rounding out its once-scanty desktop multimedia offerings and could be a source of both hardware and de facto standards for users. And Hewlett-Packard Co., bridging both the desktop and workstation markets, has articulated a clear vision of how, by 1995, it will incorporate multimedia technology in its systems to improve the human/machine interface and enhance productivity. (1995, an HP videotape that enunciates this goal, includes a persuasive demonstration of how multimedia's integration of different types of data can make users more productive.)

But perhaps the best way to understand multimedia computing is to see how it's being applied in two very different organizations—McCormick and the Business Research Institute (BRI), a Vermont-based high-technology consulting firm that provides its clients (McCormick among them) with advisories on information-technology developments, which it can deliver in a multimedia format.

At McCormick, headquartered in Hunt Valley, Md., multimedia computing crops up in at least two types of applications, according to John P. Thompson, McCormick's CIO and vice president of MIS. As a client of BRI, McCormick IS receives regular multimedia-based advisories



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on technology. The company also prepares its own multimedia presentations for both in-house and customer-marketing purposes.

"Each year we hold an internal Global Marketing and Sales Symposium for all of our divisions worldwide," said Thompson. "This year, for one of our presentations, we had a globe spinning around on a big projection screen. And then the globe sprouted flags of all the nations. And then a little satellite came by. Only, it wasn't a satellite, it was a McCor-

presentation showed the pepper-growing regions of the world, with graphics, audio-visuals and music. It showed how we test everything, and the full-quality aspects of our laboratories. It showed all our production facilities. When a conference [attendee] walked up to the touch screen, the presentation prompted him for his badge number. We already had the list of attendees from the conference registration, and as soon as he entered his badge number on the touch screen, we knew who he was

ence between [an interactive, multimedia presentation] and someone standing in a booth trying to hand you piles of paper," observed Thompson.

In fact, McCormick became involved with multimedia computing in the hope of getting rid of some paper. Thompson, like most IS people, felt the need to stay informed about technology developments but had too little time to deal directly with the overwhelming paper-based supply of source materials.

Enter BRI. In order to reduce administrative costs and improve the technological awareness and performance of his seven U.S.-based and eight overseas IS departments, Thompson selected BRI's technology advisory service. BRI, located in Stowe, Vt., regularly provides McCormick with research on particular technology topics as well as with abstracts of technology-related articles in more than 125 periodicals.

BRI's services are based on company founder and President Sam Harvey's belief that information, in order to be truly useful, should not be provided in a printed report but through an interactive, multimedia electronic delivery system.

But BRI hasn't always been a paperless information provider. Before multimedia, said Harvey, "we were just pouring these reports out like a river. You start getting [it into] your mind that your clients pay you for what you turn out, so you feel obligated to turn out [greater volumes of] information. And then you realize two things. First, the clients are not reading [the reports]. Second, they're not updatable." (For example, BRI's 1988 report on EDI had 1,500 references that could and probably would change over time.)

"We said we were keeping our clients updated, but really all we were doing was proliferating the noise. We were giving them more information on top of what they already couldn't use."

BRI's first step in addressing the problem was to develop, in 1986, an online database with indexing and querying structures. The online system had some outstanding benefits, but it still didn't meet BRI's goal of

The Trouble With Video . . .

For now, the storage and processing requirements of full-motion video put it beyond the reach of most desktop users

Would-be multimedia users should understand that there is a major difference between desktop video and desktop audio and graphics. Graphic and audio data are stored and processed digitally; this is not the case with video. Video requires more data than the platform can process. Even at the relatively low 640 by 480 resolution, a single-screen image requires 300 kilobytes of data. Full-motion video displays 30 frames each second, which means that a single second of VGA-level full-motion video consists of nine megabytes of data. A typical hard disk transfers data at less than three megabytes per second, and most PCs have internal data paths that are not a great deal faster than that. In short, a full-motion video presentation uses data faster than the platform can deliver it. Throughput aside, 60 seconds of full-motion VGA animation requires 540 megabytes of storage, which is also beyond the capacity of most desktop computers.

These limitations have encouraged the development of data compression and decompression (codec) technologies. Codec devices capable of compressing or decompressing full-motion video in real time are just now becoming commercially available. With compression ratios in the 25:1 range, such codecs promise to put digital video within reach of multimedia workstations in the next year or so.

—S. Wallace

mick pepper grinder. As it floated by, beeping, the crank turned and the pepper came out and covered the world. And then 3-D lettering [appeared]: 'McCormick—A World Class Competitor.' " In this instance, graphics, animation and sound were combined to capture attention and to convey a simple and visually engaging message.

Thompson also described a McCormick presentation at the 1990 International Food Technology Conference. "On a touch screen, our

and what his interests were. Our presentation was the only thing like that in the show. It was online, it was touchy-feely, and it had wide attraction." Thompson said that his only disappointment was that multimedia could not encompass the sense of smell.

The addition of a touch screen to the multimedia mix enabled an interactive presentation that both communicated with potential customers and collected information about their interests. "There's quite a bit of differ-



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no paper, Harvey noted. "Though our users could call up the text of a study, they still had to go to paper to get charts, drawings or pictures." Providing those graphic elements could be a nightmare, he added. For example, Harvey told of the steps involved in getting a particularly complex diagram onto a sheet of 8½-by-11-inch paper. An engineer had to draft the chart in six separate pieces and then paste them together. Then a photographer took a picture of the assembled pieces. Finally, said Harvey, the photo had to be resized to fit the paper dimension. "It cost \$2,000 to get that [result]." Using multimedia, however, "[I can take] this same chart and put it into the CAD system in a single day. The difference is unbelievable. The CAD is clearer, it's sharper; plus it's a living document. If you tell me that a piece of information on this is wrong or needs to be updated, I can change it in five minutes. I can change anything about it. It's a live, dynamic drawing. Not to mention that I can deliver it electronically anywhere in the world in seconds."

By adding these graphics capabilities to its online service, BRI achieved its goal of delivering information to its clients without using paper.

Moreover, BRI's approach to organizing the information it delivers to clients is most effectively served by the multimedia format. In his research of information technology, Harvey has been inspired by the example of *Gray's Anatomy*, the classic medical textbook. He has created an information technology "anatomy" that he believes helps BRI's clients understand the context into which new developments fit.

"We feel that without the anatomy, information-system research would be, and frequently is, chaos," said Harvey. "The anatomy provides a basis for classifying, organizing and performing continuing research on individual systems. . . . The structure allows for deeper understanding of [the] individual . . . elements, while recognizing their effect on the total network."

When BRI took its first steps away from paper, it began providing focused, online information linked to its technological anatomy—making its

"Broadcast television news, interviews, instructional videotapes, VCR movies, music, speeches, telephone conversations—any information source can be integrated right into the database."

—Sam Harvey

client advisories more easily accessible, useful and maintainable than before. To continue improving the quality of its information and to enhance customers' ability to use and learn from these resources, the company began expanding from online graphics to full multimedia computing in late 1989. Audio, animation and motion video capabilities were added to the workstation; interfaces to VCR, laser-disk and CD-ROM devices were

implemented. This meant that resource materials and briefings were no longer confined to what might once have been found on paper.

"Broadcast television news, interviews, instructional videotapes, VCR movies, music, speeches, telephone conversations—any information source can be integrated right into the database," said Harvey. With this capability, BRI can do more than provide diagrams and a text description of any element within the anatomy. Harvey used the example of an automatic-teller machine (ATM). "We can show someone driving up to an ATM and inserting their card. Then we see an animated diagram of the ATM authorization call-routing while a voice describes the communication processes. And then we can follow that with a one-minute clip from an ATM maintenance video that shows and tells how the machine is assembled and installed. And it goes on and on. Whatever level of information is necessary can be made available."

Moving to a multimedia resource base enhanced BRI's ability to inform its clients, but it complicated the management and use of the database. As the layers of BRI's computer-communication anatomy became more densely populated, the chal-

Forecast of 1994 Multimedia Applications by Market Share

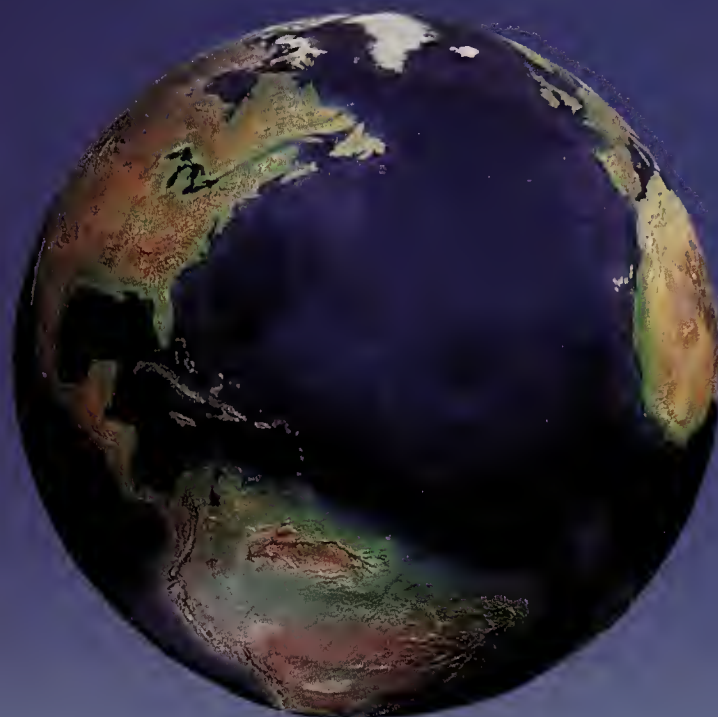
Total Expenditure = \$13.4B

ENTERTAINMENT	\$3.1B
EDUCATION AND TRAINING	\$1.7B
PUBLISHING AND DOCUMENTATION	\$1.5B
DESIGN AND SIMULATION	\$1.1B
COMMUNICATIONS	\$1B
ADVERTISING	\$.8B
SPECIAL EFFECTS	\$.7B
OTHER APPLICATIONS	\$3.5B

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lenge of presenting pertinent information grew. This management problem was greatly simplified by the use of a "hypertext" software package that manages the multimedia environment.

According to a 1990 analysis of hypertext technology by the Delphi Consulting Group, of Boston, hypertext is a way of storing information in a "web of related associations," linking relevant data in chunks, much the way the human mind does. Thus, according to the Delphi analysis, information can be presented "as ideas or a body of knowledge, not as a discon-

nected series of facts and data." The benefit of this arrangement is that users can explore deepening layers of connected information until they have exhausted the sources or their needs have been served.

BRI uses Guide, a hypertext/multimedia software product from OWL International Inc. in Bellevue, Wash., to manage its presentations and information. The BRI presentations enable users to focus on and review information, no matter how many layers deep into the anatomy the information lies.

For instance, a user may be look-

ing at a screen with a text description of a telecommunications network. Certain words within the text, such as "local-area networks," are highlighted. By positioning the cursor on the highlighted words and clicking a mouse, the user is presented with more information on the highlighted topic. In this case, a text outline of the major LAN topologies might be displayed. When the user selects a specific network topology, information on that topology alone is presented. Within that display are other highlighted terms, each of which leads to more detailed and focused information. The highlighted terms, called buttons, allow the user to readily zoom from overview to detail and to pan back again, exploring many levels and assimilating more information in greater detail.

Harvey and his staff have prepared a demonstration of how far a hypermedia information system can go. The presentation begins with the screen displaying a map of the United States. Then, said Harvey, "we zoom in on Vermont, then . . . Stowe, and then . . . BRI. . . . We look at the mountain next to BRI and we can see a cabin on the mountain. We zoom in on the cabin and we see there's something in the window. We zoom in on something in the window and it's a decorated Christmas tree. We zoom in on the Christmas tree and we can see there's a Christmas tree ball with something on it. We zoom in on the ball and we can see a picture of the mountain. And we zoom in on that mountain and we see a cabin, with a Christmas tree in the window and we zoom in on the tree and there's a ball. We do that four times. The point of the whole thing is that this type of presentation is limitless in terms of how far we can go and in terms of detail."

According to current estimates, the online portion of a typical organization's total information resource is only 2 percent. If multimedia can succeed in informing as well as it entices and engages, it could help bring Sam Harvey's goal of paperless operation a little closer into being. ☐

Scott Wallace is an independent computer industry analyst and journalist in Warwick, Mass.

Setting the Scene

Pick a platform, buy some additional hardware and software, and your microcomputer can learn a new song and dance

The basic difference between a desktop computer and a multimedia workstation is the add-in hardware and software necessary to support audio, graphics and video. The Apple Macintosh II, for example, is already equipped for graphics; adding audio is a matter of installing an inexpensive (\$200 to \$300) third-party audio board and software. Third-party video cards and software, which can be added for around \$1,000, enable Mac graphics to be combined with an external video signal, such as a VCR or camera. The resulting image can be displayed on the Mac screen or output to a recording device.

Users of IBM PC-compatible platforms will find upgrading to multimedia similarly straightforward. If the system is not already graphics-capable, it will need a graphics adapter and monitor. VGA adapters (\$200 to \$400) support displays with resolutions of 640 pixels horizontal by 480 pixels vertical in 256 colors, producing a picture comparable to broadcast television. Super VGA adapters (\$400 and up) offer higher resolutions: up to 1,280 by 1,024 with 256 colors. Your desktop system must also have a monitor (\$300 and up) matched to the resolution of its display adapter.

Adding audio capability to the PC can be done with a range of popular add-in boards costing between \$100 and \$250. A number of third-party vendors support video on the PC; cards and software cost from \$1,000 to \$3,000.

Each of the hardware elements of a multimedia system has software to manage its resources. In addition, "authoring" software is necessary to control the presentation and to coordinate and pace the audio, graphics and video. A number of third-party PC-based authoring products are available. Apple's HyperCard, a somewhat limited authoring system, is included at no charge with each Mac.

Choosing a multimedia platform, like most hardware and software selections, is best done with a clear understanding of the user's need. Although some applications require ultra-high-resolution display and RISC-level processing power, by far the bulk of current applications are well supported by VGA-scale graphics and '386 or Macintosh II computers.

—S. Wallace



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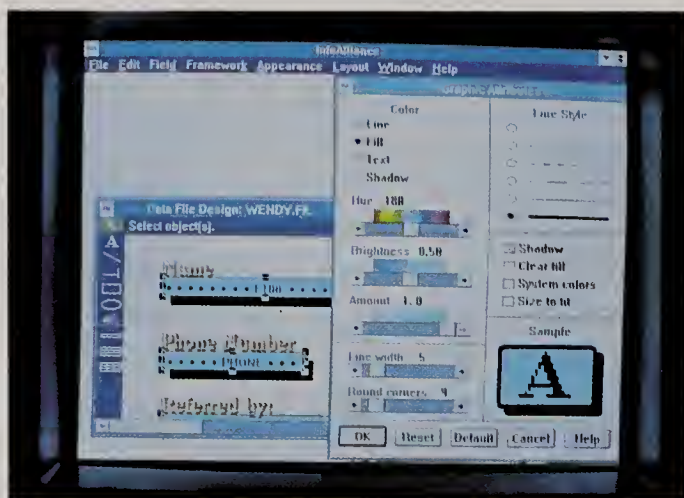
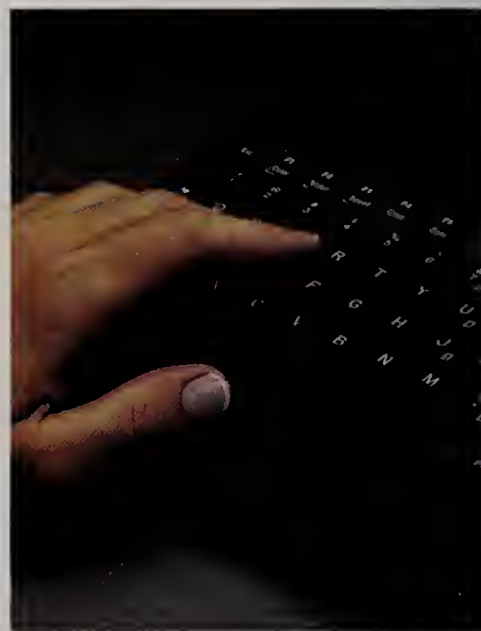
Mouse-in-the-Box

GRiD Systems Corp., of Fremont, Calif., has introduced the GRiDcase 1550sx, a PC-compatible '386-based laptop that the company says is the first to feature an on-board mouse-type input device.

According to GRiD, the mouse—called the Isopoint—enables mobile users to take full advantage of the Windows 3.0 graphic interface without sacrificing portability. The built-in mouse does away with the need for a separate, cable-connected device (the use of which can be impractical in some field situations).

The 12-pound GRiDcase 1550sx system comes standard with a 20MHz 386SX processor, 2MB of RAM, a 60MB hard drive and 3.5-inch 1.4MB floppy drive, a black & white VGA back-lit LCD screen (640-by-480 pixels) and Windows 3.0. The standard model is priced at \$6,295; configured with a 120MB hard drive, the unit sells for \$6,995.

GRiD Systems Corp. can be reached by calling 415 656-4700.



Data Interpretation

Software Publishing Corporation (SPC), of Mountain View, Calif., has introduced InfoAlliance, a data source integrator that utilizes client-server technology in an IBM OS/2 environment. The software accesses and brings together on a single screen information stored in OS/2 Data Manager, DB2, Ashton-Tate's dBase, and Microsoft's SQL Server. In the future the company will be adding access to other SQL and relational database products. While the software provides users access to corporatewide data, the system's data security features allow data to be controlled centrally or remotely. The product, which is marketed through the company's new Information Access Division, is priced from \$2,295 to \$89,500. For more information, call SPC at 415 962-8910.

Network Publishing

Heretofore, high-volume production publishers—multi-functional devices that provide high-speed, high-resolution digital-image capture, document-manipulation capabilities and improved image quality—had only stand-alone capabilities. Xerox Corp.'s "Docutech Production Publisher" will not only be the company's first such machine; it will also be the first on the market with network capability.

The Docutech base product, which will be available early this month, will not have the ability to receive documents electronically until sometime in 1991. Until then it will print documents that have been digitized through its optical scanner or are contained on a floppy disk at the rate of 135 black-and-white prints per minute.

Docutech's expected cost is well-above \$150,000—the price of Xerox's current top-of-the-line duplicator. For more information, contact Jon Robisch at 716 423-6572.

Soft Forms

Sales Technologies Inc. of Atlanta has begun selling a software "module" that enables users not only to generate electronic forms but also to automatically tailor and route the data to individual recipients.

The product, called ST Electronic Forms, allows for the complete elimination of paper forms in field sales automation and similar applications, according to the company. It enables users to design computer screens that look like paper forms, with fields for inserting information entered by the operator or called up from other databases. Once the data is organized in the form, the software can send it along to other applications. If used in conjunction with an ST network data controller, the forms-processing software allows for automatic transmittal and routing of the information.

ST Electronic Forms is available from Sales Technologies at 404 841-4000.

A Page Out of Time

Motorola Inc. of Schaumburg, Ill., has introduced The Wrist Watch Pager, a two-in-one communications product that integrates timekeeping and paging functions into one wrist piece.

The 2.1 ounce battery-powered product is splash-proof and features a nine-digit, two-line LCD that continuously displays the time, date and day for either 12- or 24-hour timekeeping. At the touch of a button, the watch display converts to a numeric pager display.

The standard model costs approximately \$300 and is available for lease in some areas. The device has non-volatile memory. For information contact Motorola Paging Division at 407 364-2000.



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CIO

CONFERENCE CALL

QUESTION: Read any good books lately?

CIOs' "must read" lists are filled with professional periodicals that help them keep abreast of the latest developments in their industries. When they do find the time to sit down with a good book, however, their interests run to the more abstract—quality, competition, artificial intelligence, and even Chinese warfare.

Robert Walsh

Vice president of logistics and materials at Schwinn Bicycle Co. in Chicago

“Comic books. . . . No, seriously, I’m reading two books. *Teaching the Elephant to Dance* by James A. Belasco, which is basically about organizational change and how you empower the organization to do something—how you teach this albatross to move briskly and lightly. The other is a translation of a Chinese book, *The Art of War* by Sun Tzu. It’s the James Clavell version, and it basically talks about how you attack the enemy. Competition has strategy and tactics not unlike war. You can learn a lot about competing and winning by understanding the tactics of war.

“I have something of a new job here. I’m in charge of MIS, logistics, the warehouse, purchasing, inventory management. We want to create competitive advantage for Schwinn through logistics. I now have the responsibility to bring these traditionally disparate groups into one division and use the computer power as the catalyst to build companywide systems. My real job title should be change agent.

The two books I’m reading

are quite appropriate. How you empower people (or disempower them), how you motivate people, how you teach an organization to be nimble and to respond. The *Elephant* book is all about creating positive change. It gives you hints on how to motivate people and how to get a sleeping giant to wake up and attack.

“I read two or three business books a year. I get subscriptions to about 70 periodicals on a wide range of topics: bikes, warehouse and material management, transportation and traffic, IS and computers, organizational development, purchasing, and business. I rarely read books, but I read six or seven hours a week of what’s happening today. I skim the index and look for stuff focusing on productivity, warehouse distribution. I also go to a couple weeks of school every year and to conferences.

“I believe my job is a fairly high-level job. Strategy is critical. If you think your job is important to the company, read these books.”

Warren Harkness

Director of Information Services for Bose Corp. in Framingham, Mass.

“*Total Quality: An Executive’s Guide for the 1990s* [a compendium of articles put together by Ernst & Whinney’s Quality Improvement Consulting Group]. I’ve been trying to focus on process improvements. The Japanese have been working on this issue for a long time. I want to discover whether the skills used in manufacturing companies in Japan are transferable to IS in both manufacturing and service companies. The ideas in the book are not geared to IS in particular but are general business issues about quality. IS is really a little service company within the firm, so it is appealing to see what tech-

niques apply.

Another book is *Future Perfect*, by Stanley M. Davis. He puts in perspective what competition is going to look like in the next decade. In particular he talks about speed to market. I like the example of a music lover going into a music store and picking from thousands of artists and having a custom-made disk put together with his favorite songs, not just one artist. Then royalties are collected and distributed. I like the time-based notion of competition.

I decide which books to read by word of mouth—particularly from people whose judgment I consider highly. The quality book was suggested by the director of customer operations at Bose. I read about six to eight business-oriented books a year.”

Ronald Workman

Director of information services at Pepper, Hamilton and Scheetz, a law firm in Philadelphia

“One book that I’ve read very thoroughly is *The Rise of the Expert Company* [by Edward Feigenbaum, Pamela McCorduck and H. Penny Nii], which is about how various companies are using artificial intelligence to raise their productivity and profits. If I were pushing something in terms of really useful information, *The Rise of the Expert Company* ought to be recommended reading.

“I’ve been looking for a way to begin to use AI

technology. What the book did was show a bunch of different approaches and how they depended on the culture of the company—how to get something started, whether to start with a seed project or get a big splash. My feeling is that expert systems are really the next wave. You can ride it, body surf in it, or sit on the beach and wait until it wipes you out.

“I tend to read few business books because I’m so busy reading *Business Week*, *Fortune*, *Digital Review*, *PC Week*, and other journals. I’m fortunate I commute by train. It gives me two hours a day to read, and I need that time to keep up with periodicals, much less the books. I can’t say what the worst book I’ve ever read is, because if it puts me to sleep three nights in a row, it’s history.”

Readers are invited to suggest Conference Call questions. Contact Senior Writer Meghan O’Leary at 508 935-4733 or by fax at 508 872-0618.

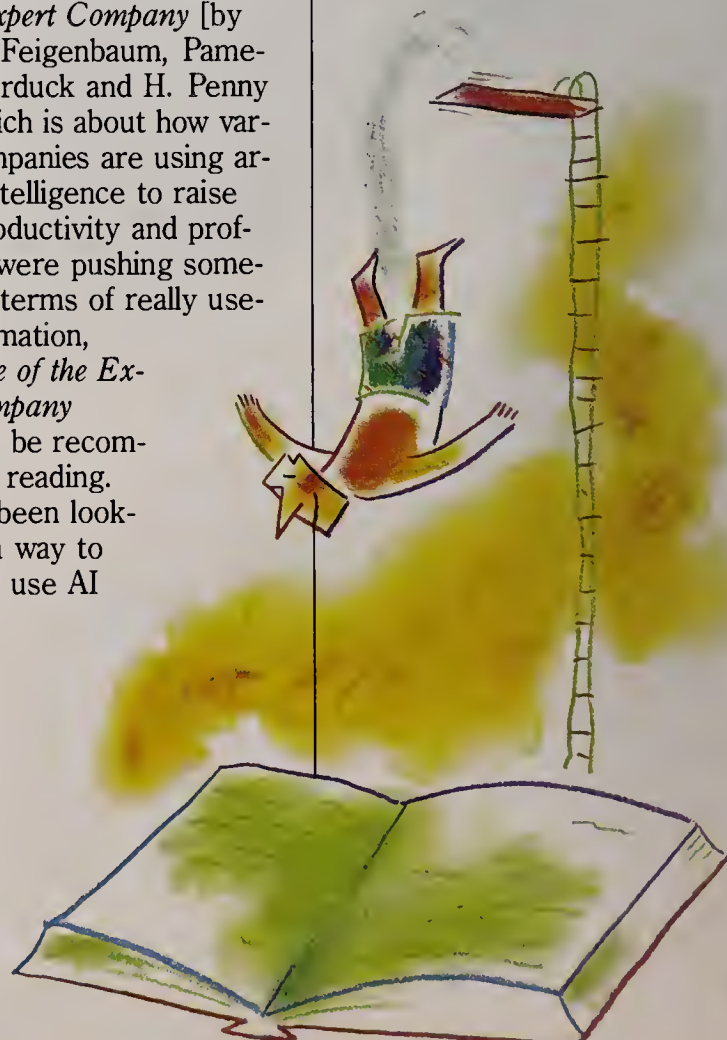
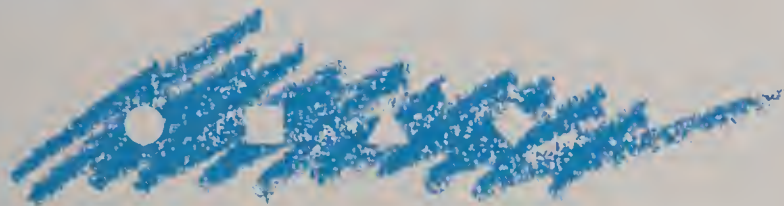


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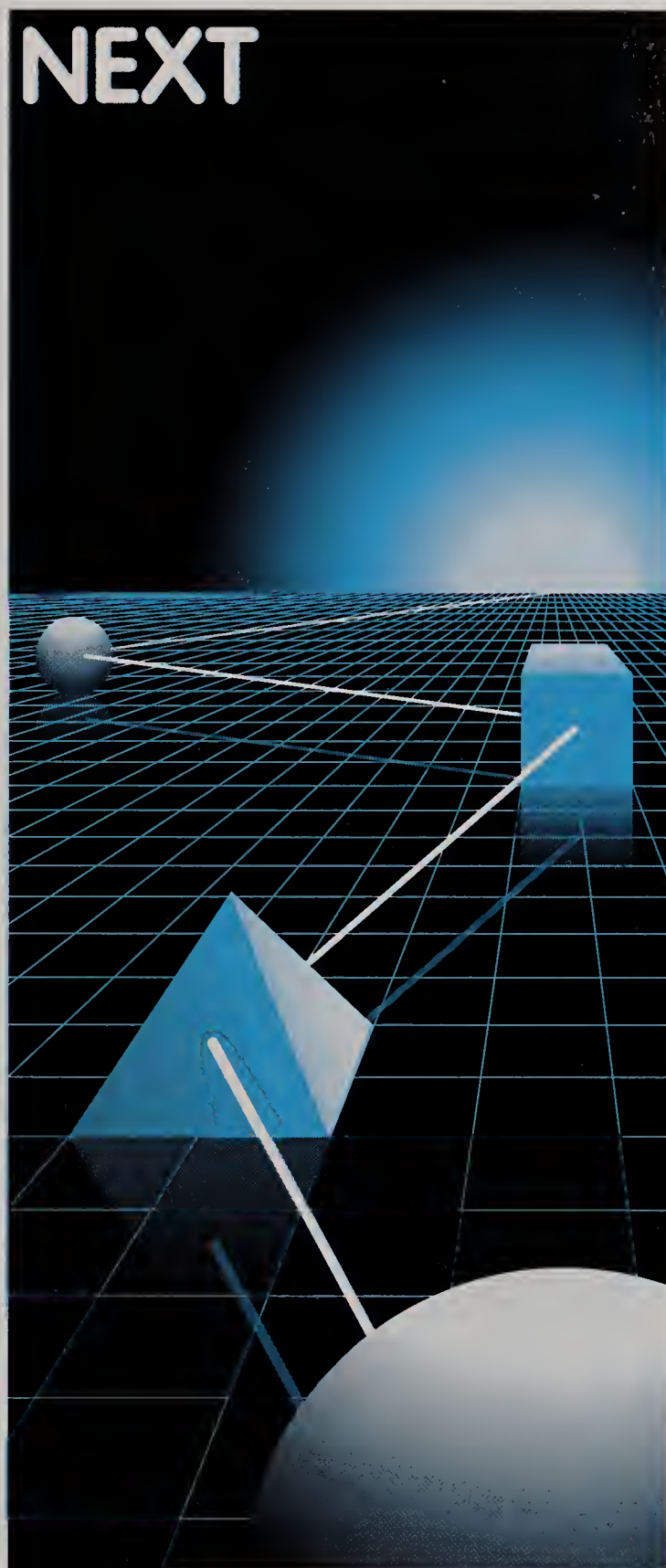
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